Portsmouth Emissions Based Assessment

Portsmouth City Council

July 2024

Delivering a better world

- Official Sensitive -

Quality information

Prepared by	Checked by	Verified by	Approved by
Sage Boyman Graduate Air Quality Consultant	Duncan Urquhart Associate Director	Anna Savage Technical Director	Anna Savage Technical Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
1.0	01/03/24	Draft	AS	Anna Savage	Technical Director
2.0	15/04/24	Final	AS	Anna Savage	Technical Director
3.0	03/05/24	Updated Final following client comments	AS	Anna Savage	Technical Director
4.0	11/06/24	Updated Final to incorporate next steps for City Centre Scheme	AS	Anna Savage	Technical Director
5.0	17/07/24	Updated Final	AS	Anna Savage	Technical Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

Portsmouth City Council

Prepared by:

Sage Boyman
Graduate Air Quality Consultant

AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
United Kingdom

T: +44(0)1256 310200
aecom.com

Table of Contents

Figures

Tables

Executive Summary

This report provides the findings of an emission assessment study conducted by AECOM Ltd on behalf of Portsmouth City Council (PCC) to assess impacts due to predicted traffic changes with the Council's Local Plan 2041.

The study focused on nitrogen oxides (NO_X), particulates and carbon dioxide (CO_2) emissions as these are the key pollutants from road vehicles. The study has analysed emissions in a baseline year of 2019 and future year of 2041 with and without the Local Plan in place. Two Local Plan scenarios were modelled, one without any mitigation and one with local mitigation, primarily focused around the City Centre.

Levels of local air quality in Portsmouth are generally good and meet current air quality objectives (AQO) in UK legislation, but there remain some areas of concern where measured levels of nitrogen dioxide (NO_2) exceed the current AQOs. These are locations close to roads in the City Centre around Alfred Road between Hope Street roundabout and the Queen Street / Anglesea Road / Alfred Road intersection and Mile End Road between the southern end of the M275 and Church Street roundabout, and now in addition Marketway. These areas are a key focus of the study in terms of considering potential human health impacts of the Local Plan.

The study has also considered CO_2 emissions as it is a key priority of PCC to reduce emissions of greenhouse gases given their declaration of a climate emergency.

The key findings of the study were that there would be substantial reductions in CO_2 and NOx emissions during the build-out of the Local Plan between 2019 to 2041 due to the significant improvements in emissions from the vehicle fleet over this period. Emissions of particulates ($PM_{2.5}$) were predicted to be similar in 2019 and 2041 due to non-exhaust emissions that are not affected by the shift to electrified technologies that is predicted in this period.

Based on the traffic model predictions, the study found that the Local Plan would lead to overall reductions in CO_2 and local air quality pollutant emissions across the whole of Portsmouth in 2041, which would lead to large net monetary benefits.

Despite this overall reduction in emissions, the analysis identified that there were several discrete areas within PCC where there was a predicted increase in traffic and emissions associated with proposed development allocations in the Local Plan. The key areas of concern identified were areas of the City Centre including Anglesea Road, Hope Street, Alfred Road and Marketway, which fall within the most deprived areas, according to the Index of Multiple Deprivation (IMD), in Portsmouth with regards to published indices on income, education and health.

The study also found that there is predicted to be slight increases in NO_X, PM_{10}, $PM_{2.5}$ and CO_2 emissions with the Local Plan 'With Mitigation' scenario in place. This is due to changes in the road layout specifically in the City Centre, directly contributing to increases in traffic flows.

The area north of the Harbour in Cosham, residential areas around a section of the Havant Bypass, north of the Hilsea area, and the Gatcombe area of Hilsea may also need further consideration to avoid any potential future air quality issues. The study has considered these areas in more detail and provided recommendations for further assessment.

In terms of ecological habitats, an associated study of Local Plan impacts showed that saltmarsh is the only habitat that could be subjected to increased nitrogen deposition and there were some ecological habitats north of the City Centre, such as Portsmouth Harbour SPA and Ramsar, that may be of concern. These are considered as part of the Habitat Regulations Assessment (HRA) of the Local Plan.

Glossary of Terms

AADT	Annual Average Daily Traffic
ANPR	Automatic Number Plate Recognition
AQMA	Air Quality Management Area
AQAP	Air Quality Action Plan
AQO	Air Quality Objectives
AQS	Air Quality Strategy
ASR	Annual Status Report
CAQMS	Continuous Air Quality Monitoring Sites
CAZ	Clean Air Zone
CO_2	Carbon Dioxide
Defra	UK Department of Environment, Food and Rural Affairs
DM	Do Minimum
DfT	Department for Transport
DS	Do Something
DT	Diffusion Tube
EFT	Emissions Factors Toolkit published by Defra
EV	Electric Vehicle
GHG	Greenhouse Gas
HDV	Heavy Duty Vehicle, >3.5 tonnes
HGV	Heavy Goods Vehicle; e.g. Lorry
HRA	Habitat Regulations Assessment
IMD	Index of Multiple Deprivation
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle, <3.5 tonnes
LGV	Light Goods Vehicle; e.g. Commercial van
NO_X	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
PCC	Portsmouth City Council
PM_{10}	Fine particulate matter with an aerodynamic diameter of 10 µm or less
$PM_{2.5}$	Fine particulate matter with an aerodynamic diameter of 2.5 µm or less
RAMSAR	A wetland site designated to be of international importance under the Ramsar Convention

SAC	Special Areas of Conservation
SPA	Special Protection Areas
SRTM	Solent Sub-Reginal Transport Model
WHO	World Health Organisation

1. Introduction

1.1 This report provides the findings of an emission assessment study conducted by AECOM Ltd on behalf of Portsmouth City Council (PCC) to assess impacts due to predicted traffic changes with the Council's Local Plan 2041.

Scope

1.2 The purpose of the study was to assess changes in emissions due to the potential traffic changes associated with the Council's Local Plan 2041. The study focused on nitrogen oxides (NO_x), particulates and carbon dioxide (CO_2) emissions as these are the key pollutants from road vehicles. The study identified potential impacts due to the Local Plan at key locations where people live and considered recommendations on areas which should be considered for further detailed assessment to better understand these impacts.

1.3 The study has focused on road vehicle emissions, as these are most likely to be affected by changes in traffic flows and journeys associated with planned new developments within the Local Plan. However, it is noted that road traffic only makes up to a quarter of NOx emissions in Portsmouth and there are other key contributing sources, including shipping (which makes up between 23-45% of emissions), domestic heating (up to 3%), industry (up to 11%) and rural sources outside of Portsmouth (up to 30%). These sources have not been considered in this assessment but have been previously reviewed as part of PCC's Clean Air Zone (CAZ) study.

1.4 The emissions assessment was based on modelled traffic data provided by Systra for a baseline year (2019) and a future year with (Do Something (DS2041) without mitigation), and without (Do Something (DM2041)) the Local Plan in place. These data were combined with vehicle fleet data from an Automatic Number Plate Recognition (ANPR) camera survey and information from PCC's air quality monitoring network modelling to understand the potential impacts of NO_2 and particulates due to the Local Plan on human health receptors. Emissions of CO_2 were also assessed across the wider administrative area.

1.5 A separate air quality assessment was conducted to inform the Habitats Regulations Assessment (HRA) for Regulation 18 of the Local Plan. This study considered impacts of nitrogen on sensitive ecosystems within the Solent Maritime Special Area of Conservation (SAC), Portsmouth, Chichester and Langstone Harbour Special Protection Areas (SPAs), Portsmouth, Chichester and Langstone Harbour wetlands of international importance (RAMSAR) and Portsmouth and Langstone Harbour Sites of Special Scientific Interest (SSSIs).

Background

1.6 In 2005, PCC declared thirteen Air Quality Management Areas (AQMAs) across the city, which represent areas with long term exceedances of the annual nitrogen dioxide (NO_2) Air Quality Objective value (AQO) close to where people live. Eight of the AQMAs were revoked in 2010, with five still in place as of March 2024. These areas have been the focus in this study as these are the key areas of concern for air quality.

1.7 The current area of concern for air quality and health effects is Portsmouth City Centre, specifically Alfred Road between Hope Street roundabout and Queen Street/ Anglesea Road/ Alfred Road intersection, Marketway and Mile End Road between M275 and Church Street Roundabout. As a means to meeting the NO_2 targets, PCC introduced a CAZ Class B in the City Centre in November 2021. The CAZ targets emissions of buses, heavy duty vehicles (HDVs) and taxis driving to/from the motorways to the centre and to the Port. PCC has also introduced a large number of associated measures to reduce emissions including bus retrofitting, changes to signalisation in the City Centre, electric vehicle (EV) charging points, changes to parking pricing and capacity and walking and cycling improvements to encourage active travel[1].

1.8 PCC has recently expanded their pollutant monitoring network to assess the impact of the CAZ and the associated supplementary measures. Although annual mean NO_2 concentrations have overall seen a decline since 2020 and are within the AQOs in the majority of the PCC administrative area, levels measured in areas of the City Centre (identified above) are still above the AQO despite the CAZ being in

[1] Portsmouth's City Council ASR 2023 (provided by PCC)

force. In 2022, there are a few roads where levels have actually increased, including Alfred Road and Hope Street.

1.9 In 2019, PCC declared a climate emergency with targets to make its own operations carbon net zero by 2030 and help the city become greener[2]. Therefore, considering impacts of the Local Plan on CO_2 is also a key focus of this study to understand if this will affect these targets.

[2] https://www.portsmouth.gov.uk/services/environmental-health/climate-action/portsmouths-climate-targets/#2030

2. Methodology

2.1 This section sets out the sources of data and methodology followed to conduct the emissions-based assessment of the Local Plan.

2.2 ANPR data from a survey conducted during 2023 was used to obtain an estimate of the type and emission standard of the fleet in Portsmouth, displayed in Figure 23. Data was obtained from a survey at three roadside locations along the M275 (Lake Road, A288 Milton Road, and Southampton Road) over two full days (48 hours in total, one weekend and one weekday). The fleet data was used within the latest version of Defra's Emission Factor Toolkit (EFT) (v12.0.1)[3]. The fleet projection tool within the EFT was used to project the 2023 Euro standard classifications[4] of the fleet backwards to the base scenario year (2019), and forwards to the future scenario year (2041). These projected fleets were then used in the EFT for each scenario (Baseline 2019, DM2041 and DS2041) with vehicle type splits taken from the traffic model.

2.3 Modelled traffic data provided by Systra from the Solent Sub-Reginal Transport Model (SRTM), working on behalf of PCC. The traffic data was provided for a series of road links for the whole of Portsmouth area and for neighbouring authorities to the north. Traffic data was in the form of 24-hour Annual Average Daily Traffic (AADT) flows, with percentage heavy duty vehicles (HDV) and average speed for the following scenarios:

- Scenario 1: 2019 Base – Current Baseline
- Scenario 2: 2041 Baseline - No Local Plan development within Portsmouth except for committed sites (i.e. the Do Minimum in this report)
- Scenario 3: 2041 Do Minimum - Full Local Plan development without transport mitigation (referred to in this report as the Do Something)
- Scenario 4: 2041 Do Something - Full Local Plan development with local transport mitigation (referred to in this report as Do Something with mitigation)

2.4 Traffic data was analysed and processed through the EFT using the corresponding the fleet to calculate emissions of oxides of Nitrogen (NO_X), Particular Matter (PM_{10} and $PM_{2.5}$) and Carbon Dioxide (CO_2) per vehicle type for each road link for each of the scenarios. These results also allowed total emissions and changes in emissions to be calculated to provide a comparison between scenarios as provided in Section 3. A source apportionment exercise, for 2019 baseline and 2041, was also conducted to illustrate the contribution of emissions by vehicle type, shown in Section 4. To consider potential long-term impacts of changes in emissions related to the Local Plan, damage costs were calculated over the plan period, and these are presented in Section 5. The final section 6 provides a summary of the key findings and a number of recommendations. A range of maps and figures to illustrate changes in traffic flows, emissions on road links, source apportionment results and deprivation were produced to illustrate the potential impacts and are presented in throughout the report and Appendix A and Appendix B.

[3] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/
[4] https://www.gov.uk/government/publications/in-service-exhaust-emission-standards-for-road-vehicles

3. Air Quality Baseline

Monitored Concentrations

3.1 The current assessment criteria applicable to the protection of human health and Local Air Quality Management (LAQM) are given in the UK's National Air Quality Standards (AQS) within the Air Quality Standards Regulations 2010 and subsequent regulations[5]. These set out AQOs for a series of pollutants, and the key ones of these of relevance to this assessment are summarised in Table 1.

Table 1 Key National Air Quality Strategy Objectives

Pollutant	Objective (µg/m^3)	Averaging Period	Not to be Exceeded More Than
Nitrogen dioxide (NO_2)	200	1 hour	18 times per year (i.e. 99.79th percentile)
	40	Annual	Not applicable
Particulate matter (PM_{10})	40	Annual	Not applicable
	50	24 hour	35 times per year (i.e. 90.4th percentile)
Particulate matter ($PM_{2.5}$)	20	Annual	Not applicable

3.2 PCC's five AQMAs were declared for exceedances of the annual mean NO_2 AQO. These AQMAs are shown in Figure 1 and summarised below:

- AQMA 6 (2005) – An area encompassing a large number of residential properties extending north along Fratton Road; from Fratton Bridge into Kingston Road, continuing into London Road until the roundabout junction with Stubbington Road and Gladys Avenue.
- AQMA 7 (2005) – An area encompassing residential properties along Hampshire Terrace and St Michaels Road gyratory.
- AQMA 9 (2005) – An area encompassing residential properties near to the southernmost section of Eastern Road from Sword Sands Road south into Velder Avenue and its junction with Milton Road.
- AQMA 11 (2010) – This area encompasses a large number of residential properties east of the west transport corridor extending along part of the M275 and Mile End Road stretching from Rudmore roundabout south to Church Street roundabout.
- AQMA 12 (2005) – An area encompassing residential properties along Queen Street mainly an area stretching form The Hard to St James' Road.

3.3 During 2022, PCC undertook non-automatic monitoring of NO_2 at 233 sites and data from these is reported in their Annual Status Report (ASR)[6], as shown in Figure 1. They also operated six continuous monitoring sites (CAQMS) during 2022, as summarised below:

- PCC's CAQMS C2 – London Road, North End;
- PCC's CAQMS C4 – Gatcombe Park Primary School, Hilsea;
- PCC's CAQMS C6 – Burrfields Road, Baffins;
- PCC's CAQMS C7 – Mile End Road, Buckland;
- Defra's CAQMS C8 – Anglesea Road, Southsea; and
- PCC's CAQMS C9 – Alfred Road, Southsea.

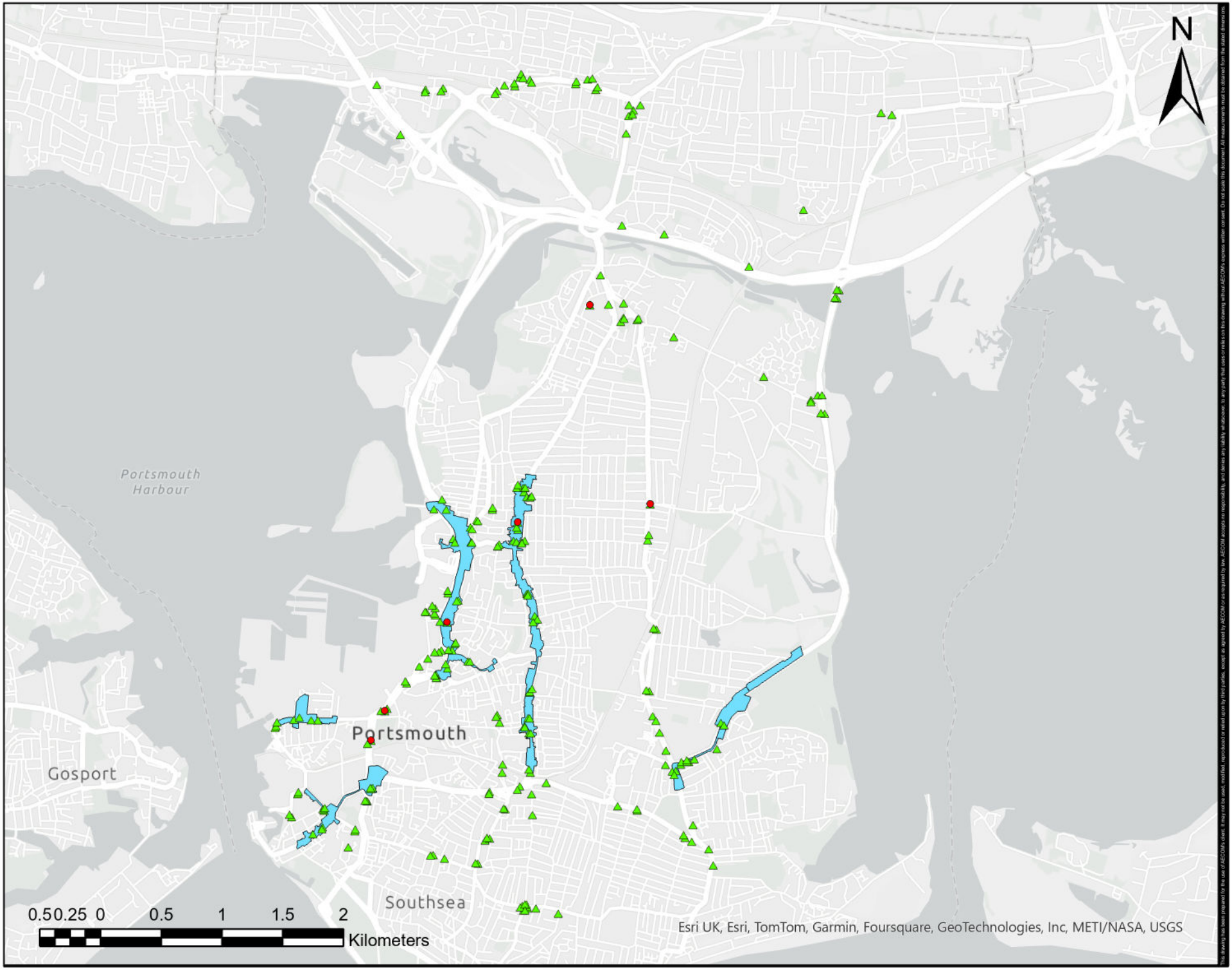
3.4 There were four exceedances of the AQO for annual mean NO_2 in 2022. These locations were at diffusion tube sites; 117, 118, 120 and 145 on Marketway, Alfred Road and Hope Street in the City Centre. These sites are located close to the existing City Centre AQMA. A value of 40.0 µg/m^3 recorded at site 213, located on the A2047 within AQMA 6. Site DT 120 on Marketway recorded the highest concentration of 51.3 µg/m^3. The diffusion tubes with the highest monitored NO_2 concentrations in 2022 are displayed in

[5] https://uk-air.defra.gov.uk/air-pollution/uk-limits
[6] https://www.portsmouth.gov.uk/services/environmental-health/air-quality-and-pollution/air-quality-in-portsmouth/

Figure 2. There was also an exceedance at the Alfred Road continuous monitoring site, where levels in 2022 were 43.5 µg/m^3.There were a number of sites where monitored concentrations increased from 2021 to 2022.

3.5 PCC also monitor particulates at their automatic sites with the highest annual mean PM_{10} concentration recorded in 2022 was 19.3 µg/m^3 at C8 on Anglesea Road. There have been no exceedances of the PM_{10} annual mean AQO or 24h mean AQO in the last few years and levels are mostly declining year on year.

3.6 In 2022, the highest annual mean $PM_{2.5}$ concentration (10.5 µg/m^3) was recorded at C8 London Road There has been no exceedances of the annual mean AQO in the last few years, although levels at Gatcombe Park and Burrfields Road increased in 2022.



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND
- Automatic Monitoring
- Diffusion Tube Monitoring
- AQMA

NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
Air Quality Monitoring Sites and AQMAs in Portsmouth

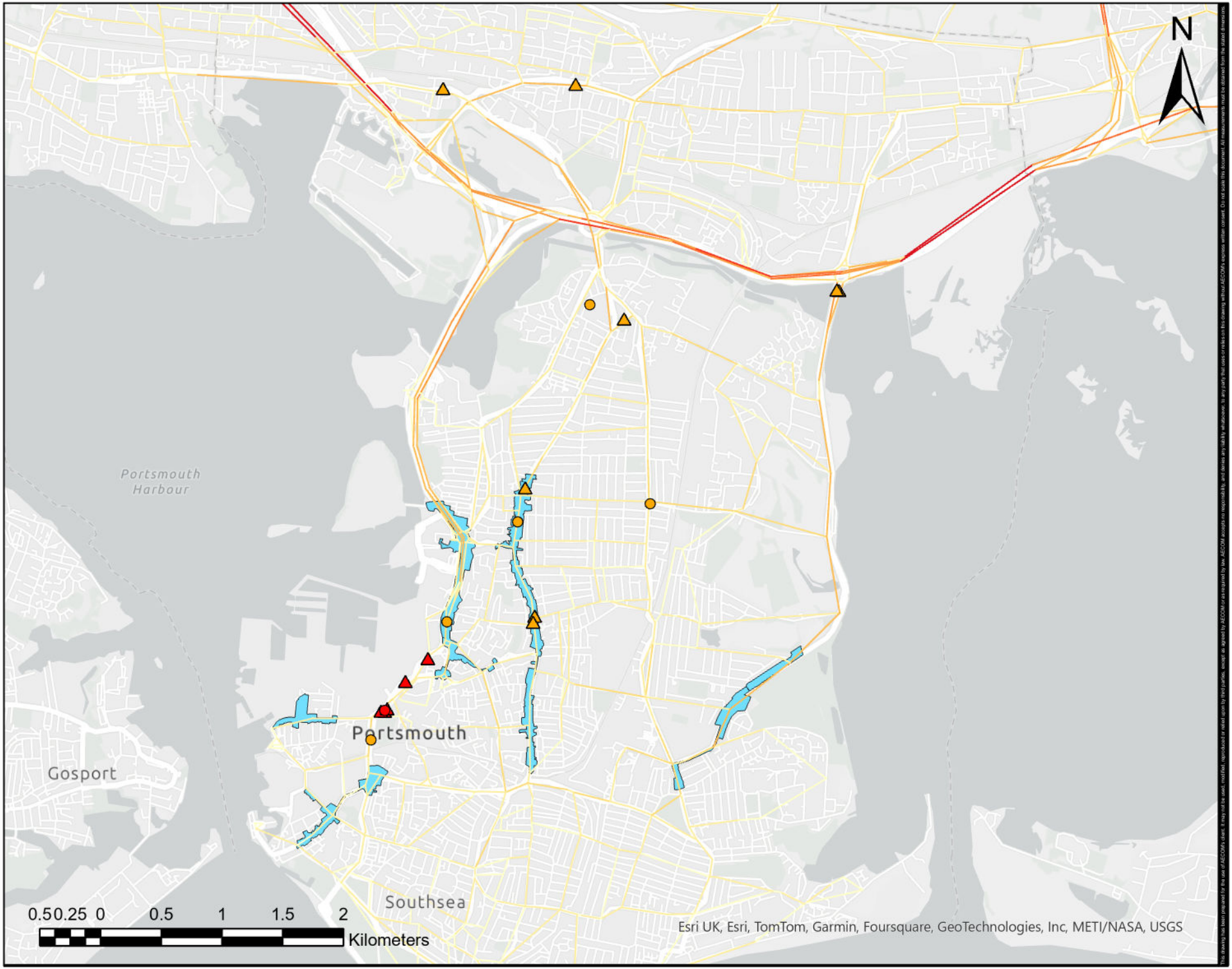
SHEET NUMBER
Figure 1

Emissions

3.7 Figure 2 to Figure 5 show that in baseline year of 2019, NOx, PM_{10}, $PM_{2.5}$ and CO_2 emissions were greatest along the major roads, including the M275, A3, A27, M27 and the A2030 in and out of Portsmouth. The areas where these roads are located include Paulsgrove and Portchester to the West, Cosham and Drayton to the North, and Farlington to the East, extending the length of the A27 and M27 roads.

3.8 NO_X emissions in the City Centre were not as high as along some of these major roads, but it is noted that exceedances of the annual mean NO_2 AQO remain around A3 Alfred Road/Hope Street/ Marketway.

3.9 Overall, as expected, the roads with the largest volumes of traffic result in the highest emissions. However, roads with high proportions of HDVs or with very low/high speed are also seen to lead to higher emissions. This can be attributed to the disproportionately higher emissions associated with heavy duty vehicles (i.e. >3.5t, such as lorries and buses) compared to cars and vans, and also the notably higher exhaust emissions from all combustion-engine vehicles at very low, or high speeds as emissions tend to be lowest at approximately 40-50km/hr.



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Monitoring exceeding NO_2 AQO (µg/m^3) - Automatic Monitors
- 14.9 - 40.0
- 40.0<

Monitoring exceeding NO_2 AQO (µg/m^3) - Diffusion Tubes
- 13.5 - 40.0
- 40.0<

2019 Road NO_X Emissions (kg/yr)
- 0 - 50
- 51 - 500
- 501 - 1000
- 1001 - 2500
- 2501 - 5000
- 5001 - 7500
- 7501 - 10000
- 10001 - 20000
- 20001 - 30000
- 30001 - 50000
- AQMA

NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

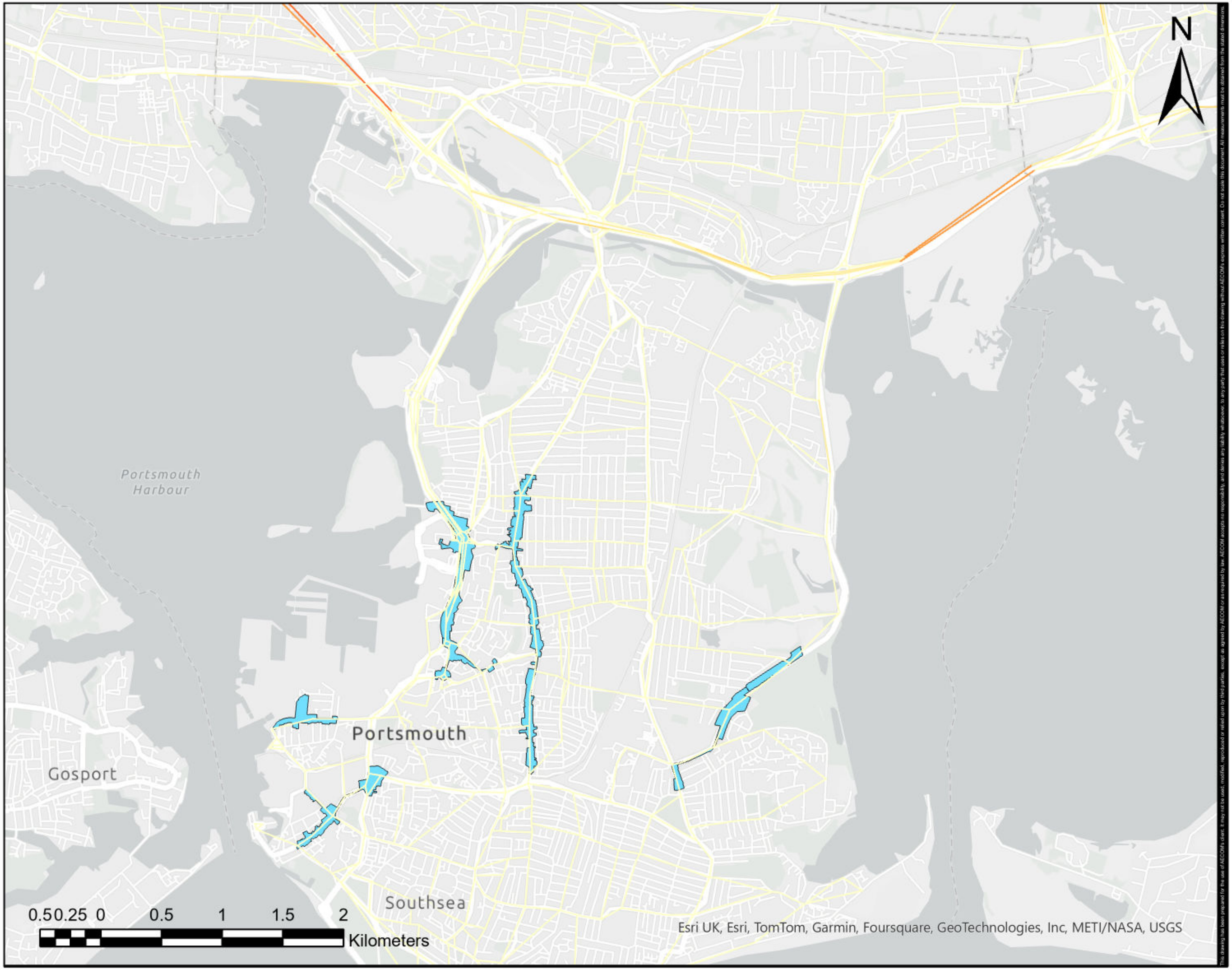
ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
2019 Road NO_X Emissions (kg/yr) and NO_2 Monitoring Sites close to or exceeding the AQO

SHEET NUMBER
Figure 2

Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024



AECOM

PROJECT

Portsmouth Emissions Based Assessment

CLIENT

Portsmouth City Council

CONSULTANT

AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

2019 Road PM_{10} Emissions (kg/yr)

- 0 - 200
- 201 - 400
- 401 - 600
- 601 - 800
- 801 - 1000
- 1001 - 1250
- 1251 - 1500
- 1501 - 1750
- 1751 - 2000
- 2001 - 2250
- AQMA

NOTES

Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE

FINAL

PROJECT NUMBER

60586784

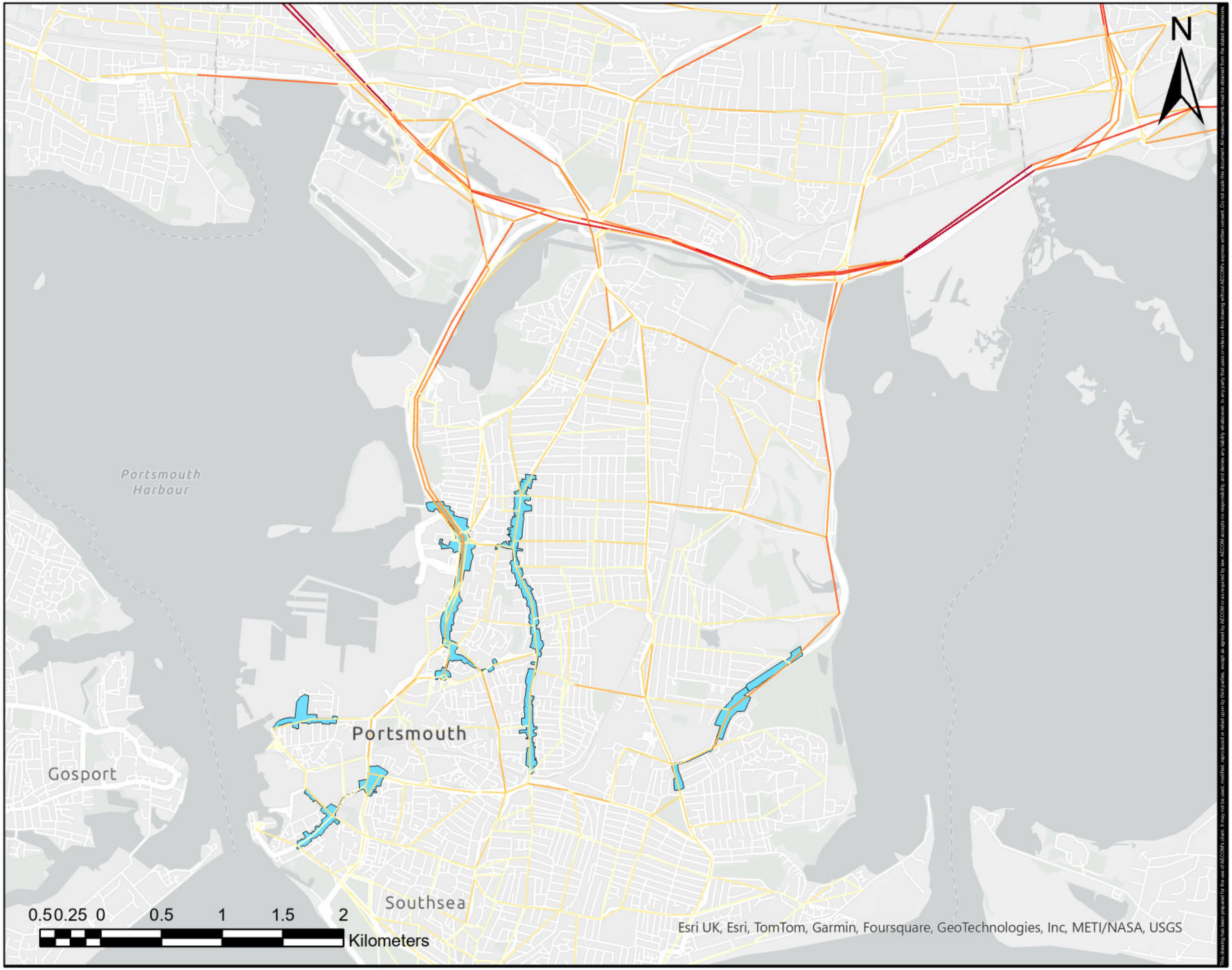
SHEET TITLE

2019 Road PM_{10} Emissions (kg/yr)

SHEET NUMBER

Figure 3

Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024



AECOM

PROJECT

Portsmouth Emissions Based Assessment

CLIENT

Portsmouth City Council

CONSULTANT

AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

2019 Road $PM_{2.5}$ Emissions (kg/yr)

- 0 - 5
- 6 - 15
- 16 - 30
- 31 - 60
- 61 - 100
- 101 - 170
- 171 - 300
- 301 - 500
- 501 - 800
- 801 - 1600
- AQMA

NOTES

Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE

FINAL

PROJECT NUMBER

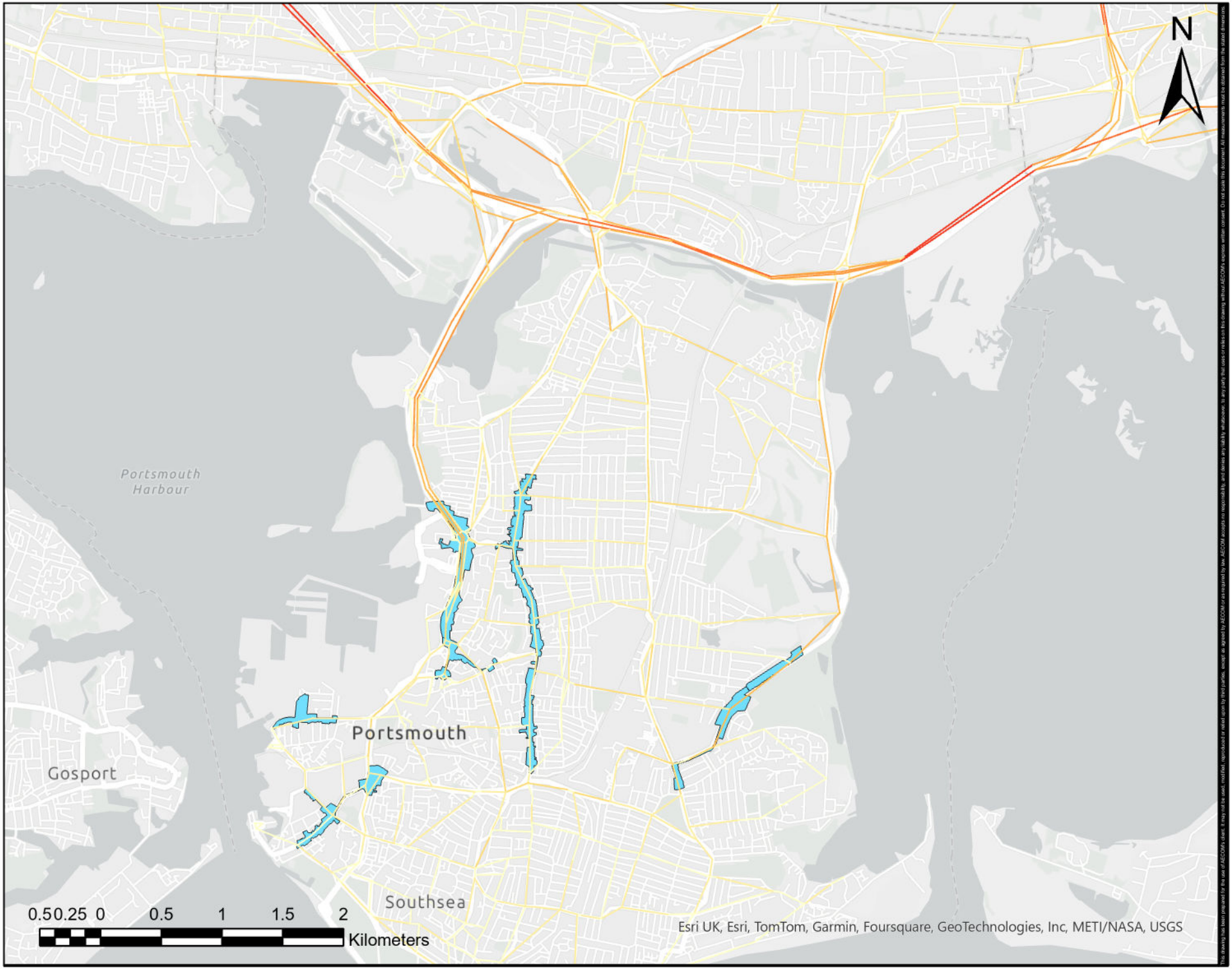
60586784

SHEET TITLE

2019 Road $PM_{2.5}$ Emissions (kg/yr)

SHEET NUMBER

Figure 4



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

2019 Road CO_2 Emissions (tonnes/annum)

- 0 - 50
- 51 - 250
- 251 - 500
- 501 - 1000
- 1001 - 2500
- 2501 - 5000
- 5001 - 10000
- 10001 - 12500
- 12501 - 15000
- 15001 - 17000
- AQMA

NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
2019 Road CO_2 Emissions (tonnes/annum)

SHEET NUMBER
Figure 5

Table 2 Portsmouth Vehicle Fleet in Baseline, 2019

Cars	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6 a/b/c	Euro 6 d-temp	Euro 6 d
Petrol	0.0%	0.4%	4.7%	23.3%	27.6%	25.4%	5.2%	13.3%	0.0%
Hybrid Petrol				3.0%	4.4%	20.5%	52.1%	20.0%	0.0%
Plugin Hybrid Petrol					1.3%	96.3%	1.2%	1.2%	0.0%
Diesel	0.0%	0.2%	0.6%	8.2%	20.6%	38.9%	31.5%	0.0%	0.0%
Hybrid Diesel				0.0%	0.0%	70.2%	10.3%	19.5%	0.0%

LGVs	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6_1	Euro 6_2	Euro 6_3
Petrol LGV	0.0%	0.0%	3.6%	25.2%	13.1%	13.4%	15.1%	29.7%	0.0%
Diesel LGV	0.0%	0.2%	1.4%	8.6%	21.8%	35.0%	9.7%	23.2%	0.0%
Petrol Taxi	0.0%	0.0%	3.9%	13.5%	16.5%	18.2%	16.2%	31.8%	0.0%
Diesel Taxi	0.0%	0.0%	0.7%	4.6%	15.8%	32.3%	21.1%	25.4%	0.0%

Heavy Duty Vehicles	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V_EGR	Euro V_SCR	Euro VI	Euro II SCRRF	Euro III SCRRF	Euro IV SCRRF	Euro V SCRRF to EGR
Rigid HGVs	0.0%	0.6%	2.1%	10.9%	15.9%	8.8%	26.5%	35.0%	0.0%	0.0%	0.0%	0.0%
Artic HGVs	0.0%	0.1%	0.2%	0.2%	0.1%	4.9%	14.6%	80.0%	0.0%	0.0%	0.0%	0.0%
Conventional Buses	0.0%	0.1%	1.0%	3.0%	6.2%	8.9%	26.6%	54.1%	0.0%	0.0%	0.0%	0.0%
Hybrid Buses					0.0%	20.4%	61.1%	18.5%				
Conventional Coaches	0.0%	0.1%	1.0%	3.0%	6.2%	8.9%	26.6%	54.1%		0.0%	0.0%	0.0%
Hybrid Coaches					0.0%	20.4%	61.1%	18.5%				

Note: Some vehicle classes have been excluded so total is not add up to 100%.

Source Apportionment - 2019

3.10 The EFT was run to consider the contribution of NO_X emissions by vehicle type. This exercise is known as source apportionment and the key results for different areas of the city are discussed below. The figures are presented in Section 5 alongside the results for the 2041 future year.

North/Northwest Portsmouth

3.11 Examples of the breakdown of NO_X emissions by vehicle type for selected links in this area is shown in Figure 17 and Figure 18. For example, for a section of the M27, the largest contributor to NO_X emissions was diesel cars at 33.1%, followed by rigid Heavy Goods Vehicles (HGVs) at 20.5%.

Portsmouth City Centre

3.12 Examples of the contribution of NO_X emissions by vehicle type is shown in Figure 19 and Figure 20.

3.13 On the A3 Marketway, the largest contributor to NO_X emissions were rigid HGVs at 27.5%, followed by diesel cars at 25.4%. On this road, the percentage emission contribution of diesel buses and coaches is much greater than in other areas of Portsmouth due to it being a main location for public transport routes. On the A3 Commercial Road, the largest contribution was from diesel cars at 41.9%, followed by diesel Light Goods Vehicles (LGVs) at 24.9%.

North/Northeast Portsmouth

3.14 The breakdown of NO_X emissions by vehicle type for selected roads is shown in Figure 21 and Figure 22.

3.15 On a section of Havant Bypass (A27), the largest contribution to NO_X emissions was from diesel cars at 35.6%, followed by diesel LGVs at 29.2%. On the Eastern Road (A2030), the largest emission contributor were diesel cars at 31.7%, followed by rigid HGVs at 22.0%.

4. Local Plan Assessment

Emissions

4.1 The total baseline emissions from the roads assessed in the study are shown in Table 3.

4.2 The Baseline 2019 emissions totals are based on the vehicle fleet that has been back projected from the observed fleet in 2023, shown in Table 2, whilst the DM and DS 2041 emissions totals are based on the vehicle fleet projected forward from the observed fleet in 2023, shown in Table 5.

4.3 From 2019 to 2041, Table 3 shows a substantial change in total annual emissions of NO_x. This can be attributed to the 22-year difference between these scenarios and large reduction in exhaust emissions from the vehicle fleet. However, over this time period, $PM_{2.5}$ emissions are expected to only slightly decrease from 53.9 to 51.3 tonnes per year, whilst PM_{10} emissions are expected to increase from 87.2 to 94.2 tonnes per year. This increase can be attributed to the increased non exhaust emissions expected with electrification of the vehicle fleet.

4.4 Table 3 shows that emission in 2041 are lower in the 'Do Something' Scenario with the Local Plan in place, compared with the 'Do Minimum' Scenario without the Local Plan. This is understood to be due to predicted re-routing of vehicles on the network due to the changes in congestion associated with the planned development. For example, vehicles (particularly heavy-duty vehicles) are predicted to travel on routes with less congestion, thereby reducing emissions. Specifically, a reduction in congestion means there are less engines likely to be emitting higher levels of pollutants as they idle in traffic, which in turn means there are lower emissions.

4.5 With local mitigation in place (ie DS2041 with Mitigation), there is expected to be an increase in annual emissions from NO_X, PM_{10}, $PM_{2.5}$ and CO_2 across all links. This is due to expected overall increases in vehicle kilometres travelled (see Table 4) and the change in layout and alteration of some one-way roads to two-way roads in the City Centre. The City Council is undertaking further work specifically considering these road links in the City Centre. The work is intended to revisit the proposed layouts and mitigations in order to reach a solution that ensures that development does not worsen air quality. This work is expected to be completed in Autumn 2024.

Table 3 Total Annual Emissions from all links in all Scenarios

Scenario	Total Annual Emissions from all links in Base 2019, DM and DS 2041 (tonnes/yr) *(Percentage Change)*			
	NO_X	PM_{10}	$PM_{2.5}$	CO_2
Baseline 2019	1,128.2	87.2	53.9	518,103.8
DM2041	171.3	94.2	51.3	402,048.3
DS2041	168.6	91.8	49.9	390,217.7
DS2041 with Mitigation	172.0	96.0	52.3	409,386.3
Change between Baseline and DM	-956.9 *(-85%)*	+7.0 *(+8%)*	-2.6 *(-5%)*	-116,055.5 *(-22%)*
Change between DM and DS	-2.7 *(-2%)*	-2.4 *(-3%)*	-1.4 *(-3%)*	-11,830.6 *(-3%)*
Change between DS with Mitigation and DS	+3.4 *(+2%)*	+4.2 *(+4%)*	+2.4 *(+5%)*	+19,168.6 *(+5%)*

Note: Cells shaded in Green suggest a decrease, and cells shaded in Red suggest an increase.

4.6 Table 4 shows that total vehicle kilometres increase between the 2019 baseline and 2041 as the number of vehicles on the road network increases. The Local Plan (DS2041) is predicted to result in a reduction of vehicles travelled across the network by around 4% compared to without the Local Plan. However, with the Local Plan mitigation scenario, vehicle kilometres are predicted to increase by 5% compared to without mitigation. This is likely to be due to an increase in traffic volumes within the City Centre as a result of the changes in road layout. However, despite this, the total network across Portsmouth

decreases slightly with the Local Plan with mitigation. The revised City Centre road layout and mitigations work is expected to result in a further change to the number of total vehicle kilometres travelled.

Table 4 Total Vehicle Kilometres (vkm) and Network Kilometres (km) travelled across all links in all Scenarios

Scenario	Total Vehicle Kilometres (vkm) *(Percentage Change)*	Total Network Kilometres (km)
Baseline 2019	6,518,830	720
DM2041	8,569,871	809
DS2041	8,241,559	809
DS2041 with Mitigation	8,694,853	791
Change between DM and Baseline	+2,051,041 *(+31%)*	+89 *(+12%)*
Change between DS and DM	-328,312 *(-4%)*	0 *(<1%)*
Change between DS with Mitigation – DS	+453,293 *(+5%)*	-18 *(-2%)*

Note: Cells shaded in Green suggest a decrease, and cells shaded in Red suggest an increase.

4.7 Table 5 shows that by 2041, all LGVs will be Euro 6d, all petrol cars and 98.9% of diesel cars will be at least Euro 6 and all HGVs and 99.7% of buses and coaches will be Euro VI. The vehicle fleet is expected have significantly reduce emissions between 2019 to 2041 in response to the government's decarbonisation plan to ensure all new vehicles are zero emission by 2035.

Table 5 Portsmouth Vehicle Fleet, 2041

Cars	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6 a/b/c	Euro 6 d-temp	Euro 6 d
Conventional Petrol	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Hybrid Petrol				0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Plugin Hybrid Petrol					0.0%	0.0%	0.0%	0.0%	100.0%
Conventional Diesel	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	0.0%	98.9%
Hybrid Diesel				0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

LGVs	Pre-Euro 1	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6_1	Euro 6_2	Euro 6_3
Petrol LGV	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Diesel LGV	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Petrol Taxi	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Diesel Taxi	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Heavy Duty Vehicles	Pre-Euro I	Euro I	Euro II	Euro III	Euro IV	Euro V_EGR	Euro V_SCR	Euro VI	Euro II SCRRF	Euro III SCRRF	Euro IV SCRRF	Euro V SCRRF to EGR
Rigid HGVs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
Artic HGVs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
Conventional Buses	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	99.7%	0.0%	0.0%	0.0%	0.0%
Hybrid Buses					0.0%	0.0%	0.0%	100.0%				
Conventional Coaches	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	99.7%		0.0%	0.0%	0.0%
Hybrid Coaches					0.0%	0.0%	0.0%	100.0%				

Note: Some vehicle classes have been excluded so total is not add up to 100%.

NO_X Emissions

4.8 Figure 6 and Figure 7 display the total annual NOx emissions across the whole of the Portsmouth modelled road network in the DM2041 and DS2041 scenarios.

4.9 Figure 10 and Figure 11 show the changes in AADT between scenarios DS2041 and DM2041. These figures are separated into Portsmouth City Centre and Portsmouth Harbour, by Horsea Island and Port Solent, which are key areas of concern in terms of local air quality.

4.10 Figure 12, Figure 13 and Figure 14 present the changes in NO_X Emissions between DS2041 and DM2041 for Portsmouth City Centre, Portsmouth Harbour and North/Northeast Portsmouth. Appendix A provides two further figures, Figure 21 showing the distribution of the Strategic Sites and Allocations within the Portsmouth's Local Plan[7], and Figure 24 illustrates the Index of Multiple Deprivation (IMD)[8]. The IMD provides a measure of relative deprivation at a local area level across England and can be used to inform mitigation.

4.11 There is a correlation between areas of high deprivation and areas where the highest emissions are seen. The indices of the IMD, which are of most concern for this study are the ones related to health, income, and education. As seen in Figure 24, the IncScore plotted suggests that the main area of Portsmouth City Centre is the most deprived across Portsmouth in terms of the Income index. This area is also most deprived in regard to the education and health, which aligns with the location of the some of the busiest and highest emitting roads in Portsmouth, such as the Alfred Road, Anglesea Road, Hope Street and Marketway.

4.12 As a large area of the City Centre is allocated for development within the Local Plan extending from Church Street roundabout all the way south to the University of Portsmouth, it is important that the effects on the City Centre are of particular focus. This area of the City Centre also is one of the most deprived areas around the City Centre, according to the IMD, and has the highest measured pollution levels. For example, concentrations Alfred Road are some of the highest in Portsmouth, with measured NO_2 concentration still well above the annual mean objective value in 2022. Although, Portsmouth's CAZ surrounds the City Centre and was enforced in the hope that NO_2 concentrations would decrease, its effectiveness is yet to be assessed.

4.13 Figure 12 shows that in the City Centre, the increases in NO_X emissions predicted with the Local Plan in place, including along Alfred Road, Marketway and Hope Street. These increases can be attributed to traffic associated with sites of proposed new development sites in this area.

4.14 Figure 13 shows that in the Northwest, around Horsea Island and the North Harbour Marina, some of the greatest increases in NO_X emissions are predicted with the Local plan in place. This aligns with where the Lakeside North Harbour proposed employment development site of Portsmouth's Local Plan is located (Figure 23).

4.15 It is noted that here are no exceedances of the NO_2 AQO at monitoring sites in this part of Portsmouth. Figure 14 shows that to the North/Northeast of Portsmouth, the flyover of the A2030 road and part of the A27 road, there are predicted increases in NO_X emissions as well. These locations, however, aren't located near any proposed Portsmouth Local Plan allocations. However, the increases in traffic from other development sites may cause increases elsewhere in Portsmouth.

4.16 The total annual NO_X emissions in the City Centre in the DS2041 with Mitigation scenario are displayed in Figure 15, and the total AADT flows are displayed in Figure 16. On Hope Street specifically, the current one-way street is being changed to a two-way street as one of the mitigation measures, which is expected to cause changes to the emissions. Elsewhere on the road network, the differences between the with and without mitigation scenarios is negligible, so no further figures have been provided.

Particulate Matter ($PM_{2.5}$) Emissions

4.17 In terms of $PM_{2.5}$ emissions, Figure 8 and Figure 9 show that by 2041, emission rates are expected to be similar to existing levels in 2019. Despite predicted increases in traffic flow, exhaust emissions will decline, but non-exhaust emissions from tyre and brake wear are predicted to become a more significant issue in the future.

[7] https://www.portsmouth.gov.uk/services/development-and-planning/planning-policy/local-development-scheme/
[8] https://www.gov.uk/government/collections/english-indices-of-deprivation

4.18 The PM breakdown that are outputted from the EFT v12.0.1 divides PM into exhaust and non-exhaust emissions. The emission factors for non-exhaust activities such as brake and tyre wear as well as road abrasion, differ between PM_{10} and $PM_{2.5}$. However, the EFT do not do this same scaling for exhaust emissions for PM_{10} and $PM_{2.5}$, which alters the relative change predicted for these pollutants in the future. Therefore, the outcome for PM exposure should be considered carefully in any future work and there may be specific value to disaggregation of the non-exhaust component when informing mitigation action.

4.19 This can be attributed to trends seen in PM emissions. A report on 'Emissions of air pollutants in the UK – Particulate Matter (PM_{10} and $PM_{2.5}$)' produced by the UK Government[9], stated that exhaust emissions have decreased by 93 % for both $PM_{2.5}$ and PM_{10} from 1996 to 2022 due to stricter emissions standards. However, non-exhaust emissions (brake, tyre and road wear) have increased by 15% for $PM_{2.5}$ and increased by 14 % for PM_{10} between 1996 and 2022, as the overall number of kilometres travelled by vehicles each year in the UK has increased over this period. Most PM emissions from road transport are therefore from non-exhaust emissions and this is an issue that needs to take priority in the future.

4.20 $PM_{2.5}$ emissions are predicted to be similar across the city, with the highest rates along the major roads going into and out of Portsmouth (M27, A27 and A2030). However, unlike with the trends seen with NO_X emissions by 2041, roads links extending into the City Centre are expected to remain high in 2041 (e.g. along the A3).

4.21 To the west, the A2030 Eastern Road is predicted to have high $PM_{2.5}$ emission rates by 2041. Located in the Baffins and Milton area, a section of this road is situated within AQMA No.9, and therefore has been an area of concern for NO_2 concentrations in previous years. However, as seen in Figure 6 and Figure 7, by 2041 these concentrations are expected to be much lower, and therefore more priority should be given to potentially dealing with $PM_{2.5}$ instead of NO_2.

[9] https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25#:~:text=Exhaust%20emissions%20have%20decreased%20markedly,15%20per%20cent%20for%20PM2.

CO_2 Emissions

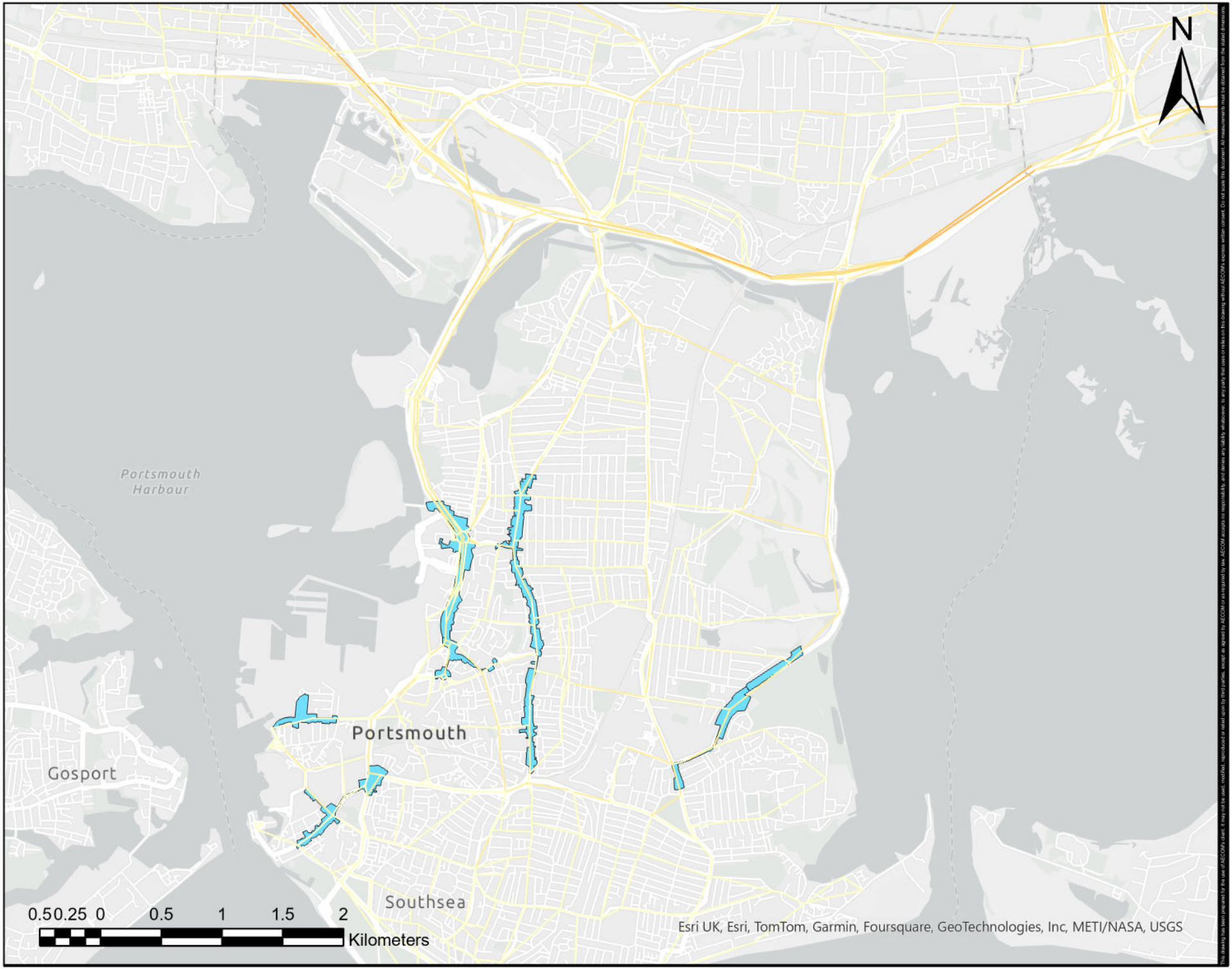
4.22 CO_2 is a regional pollutant, and so is not appraised in terms of local exposure. Figure 5 displays the total annual CO_2 emissions across the whole of the Portsmouth modelled road network in the Baseline 2019 Scenario. The results show that CO_2 emissions rates are highest are along the major roads in and out of Portsmouth (M27, A27 and A2030), particular the section of A27 near to St. John's College Playing Fields.

4.23 The CO_2 emissions for all links for each Scenario are displayed in Table 6. These findings suggest that without the Local Plan, between 2019 and 2041, total CO_2 emissions are expected to significantly decrease, despite an increase in indirect emissions from charging and other sources associated with the increase in electric vehicles. When comparing scenarios DM2041 and DS2041 without mitigation, CO_2 emissions are expected to decrease further with the Local Plan in place. However, total CO_2 emissions in the DS2041 with mitigation scenario are expected to increase slightly compared to without mitigation, due to the predicted increase in vehicle kilometres travelled. The City Council is undertaking further work specifically considering these road links and potential mitigations in the City Centre. The work is intended to revisit the proposed layouts in order to reach a solution that ensures that development has a neutral or beneficial impact on CO_2 emissions. This work is expected to be completed in Autumn 2024.

Table 6 Total CO_2 Emissions and breakdown between Indirect and Direct Emissions for all Scenarios

Scenario	Total CO_2 Emissions (tonnes/annum)	Direct CO_2 Emissions from Tailpipe (tonnes/annum)	Indirect CO_2e Emissions from Electric Charging (tonnes/annum)
Baseline 2019	518,103.8	517,287.4	816.4
DM2041	402,048.3	396,644.3	5,404.0
DS2041	390,217.7	385,003.6	5,214.1
DS2041 with Mitigation	409,386.3	403,906.9	5,479.4
Change Between DM and Baseline	-116,055.5	-120,643.1	+4,587.6
Change Between DS - DM	-11,830.6	-11,640.7	-189.9
Change Between DS with Mitigation - DS	+19,168.6	+18,903.3	+265.3

Note: Cells shaded in Green suggest a decrease, and cells shaded in Red suggest an increase.



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

DM2041 Road NO_X Emissions (kg/yr)

- 0 - 50
- 51 - 500
- 501 - 1000
- 1001 - 2500
- 2501 - 5000
- 5001 - 7500
- 7501 - 10000
- 10001 - 20000
- 20001 - 30000
- 30001 - 50000
- AQMA

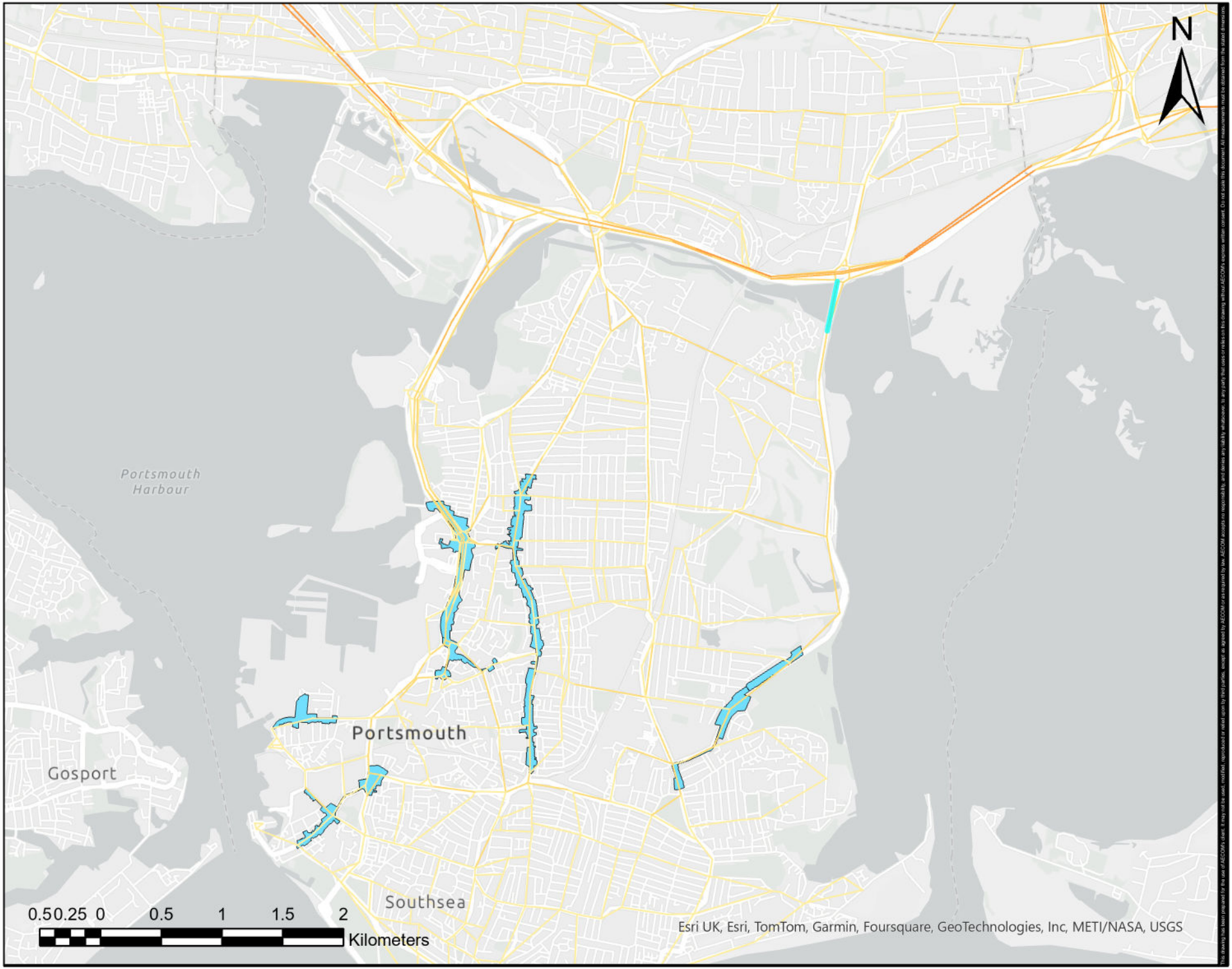
NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
DM2041 Road NO_X Emissions

SHEET NUMBER
Figure 6



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

DS2041 Road NO_X Emissions (kg/yr)

- 0 - 50
- 51 - 500
- 501 - 1000
- 1001 - 2500
- 2501 - 5000
- 5001 - 7500
- 7501 - 10000
- 10001 - 20000
- 20001 - 30000
- 30001 - 50000
- AQMA

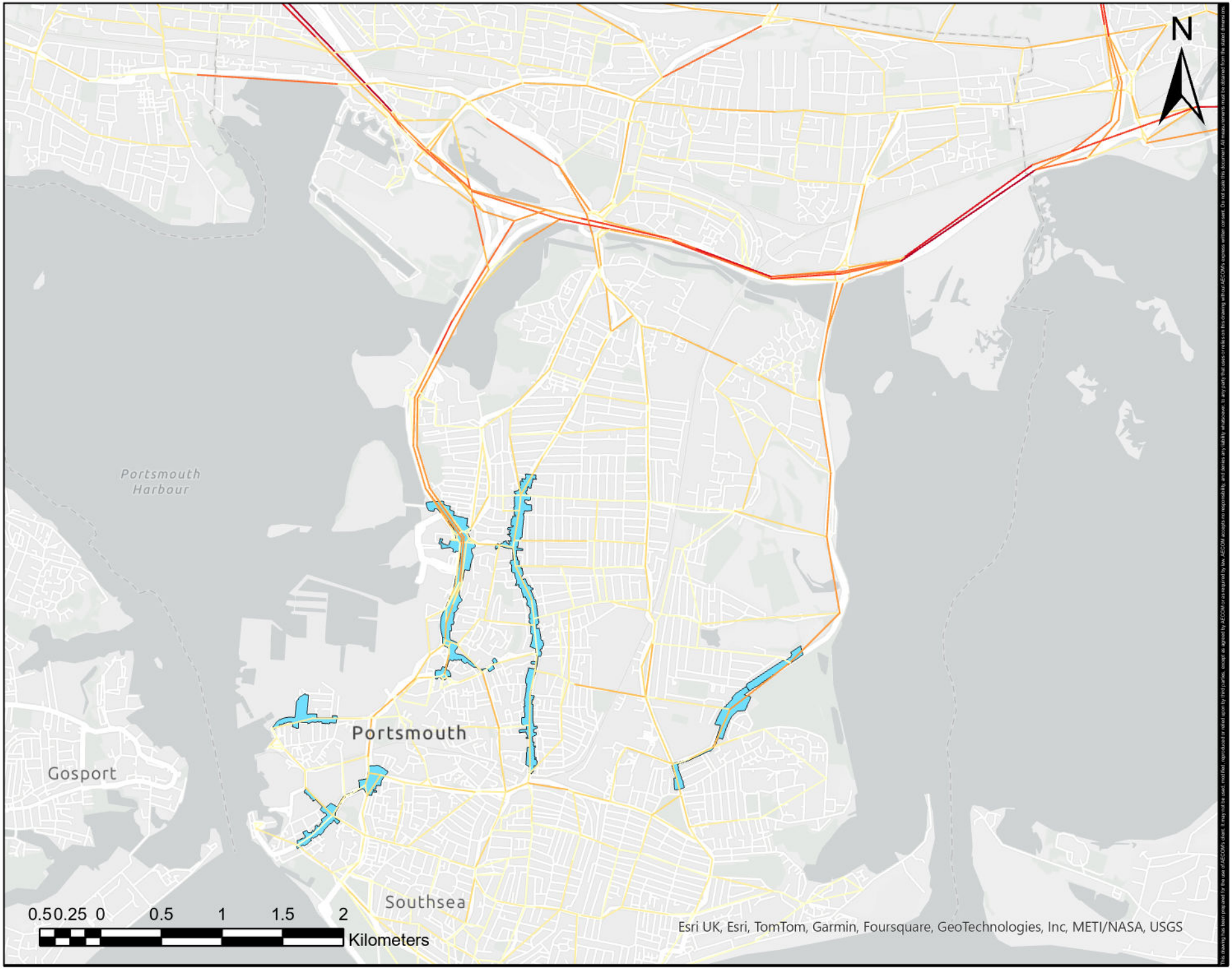
NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
DS2041 Road NO_X Emissions

SHEET NUMBER
Figure 7



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

DM2041 Road $PM_{2.5}$ Emissions (kg/yr)

- 0 - 5
- 6 - 15
- 16 - 30
- 31 - 60
- 61 - 100
- 101 - 170
- 171 - 300
- 301 - 500
- 501 - 800
- 801 - 1600
- AQMA

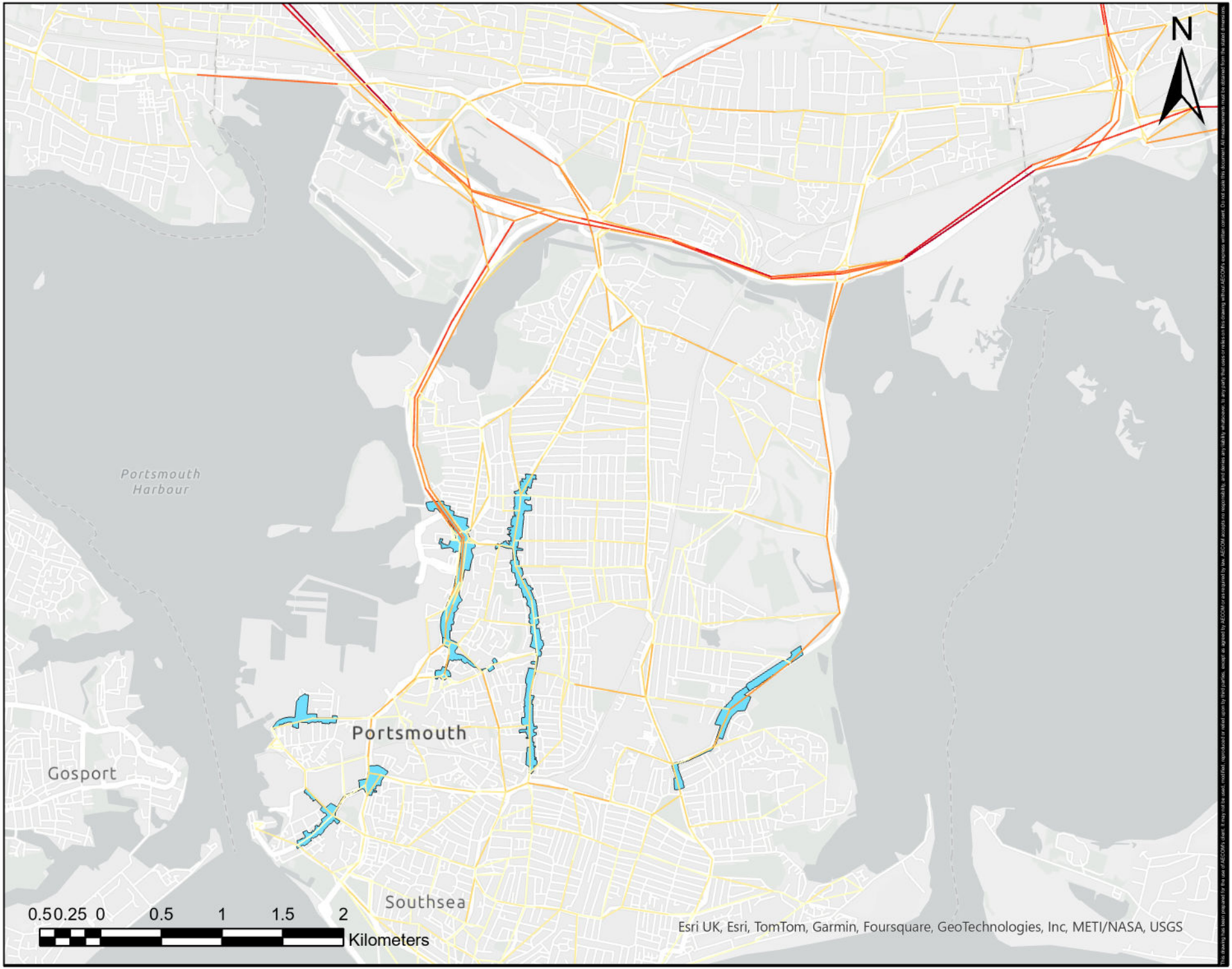
NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
DM2041 Road $PM_{2.5}$ Emissions

SHEET NUMBER
Figure 8



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

DS2041 Road $PM_{2.5}$ Emissions (kg/yr)

- 0 - 5
- 6 - 15
- 16 - 30
- 31 - 60
- 61 - 100
- 101 - 170
- 171 - 300
- 301 - 500
- 501 - 800
- 801 - 1600
- AQMA

NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
DS2041 Road $PM_{2.5}$ Emissions

SHEET NUMBER
Figure 9

Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT

Portsmouth Emissions Based Assessment

CLIENT

Portsmouth City Council

CONSULTANT

AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Monitoring exceeding NO_2 AQO (µg/m^3) - Automatic Monitors

- 14.9 - 40.0
- 40.0<

Monitoring exceeding NO_2 AQO (µg/m^3) - Diffusion Tubes

- 13.5 - 40.0
- 40.0<

Change in AADT (DS2041-DM2041)

- -216 - 0
- 1 - 736
- 737 - 1392
- 1393 - 3021
- 3022 - 6652
- AQMA

NOTES

Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE

FINAL

PROJECT NUMBER

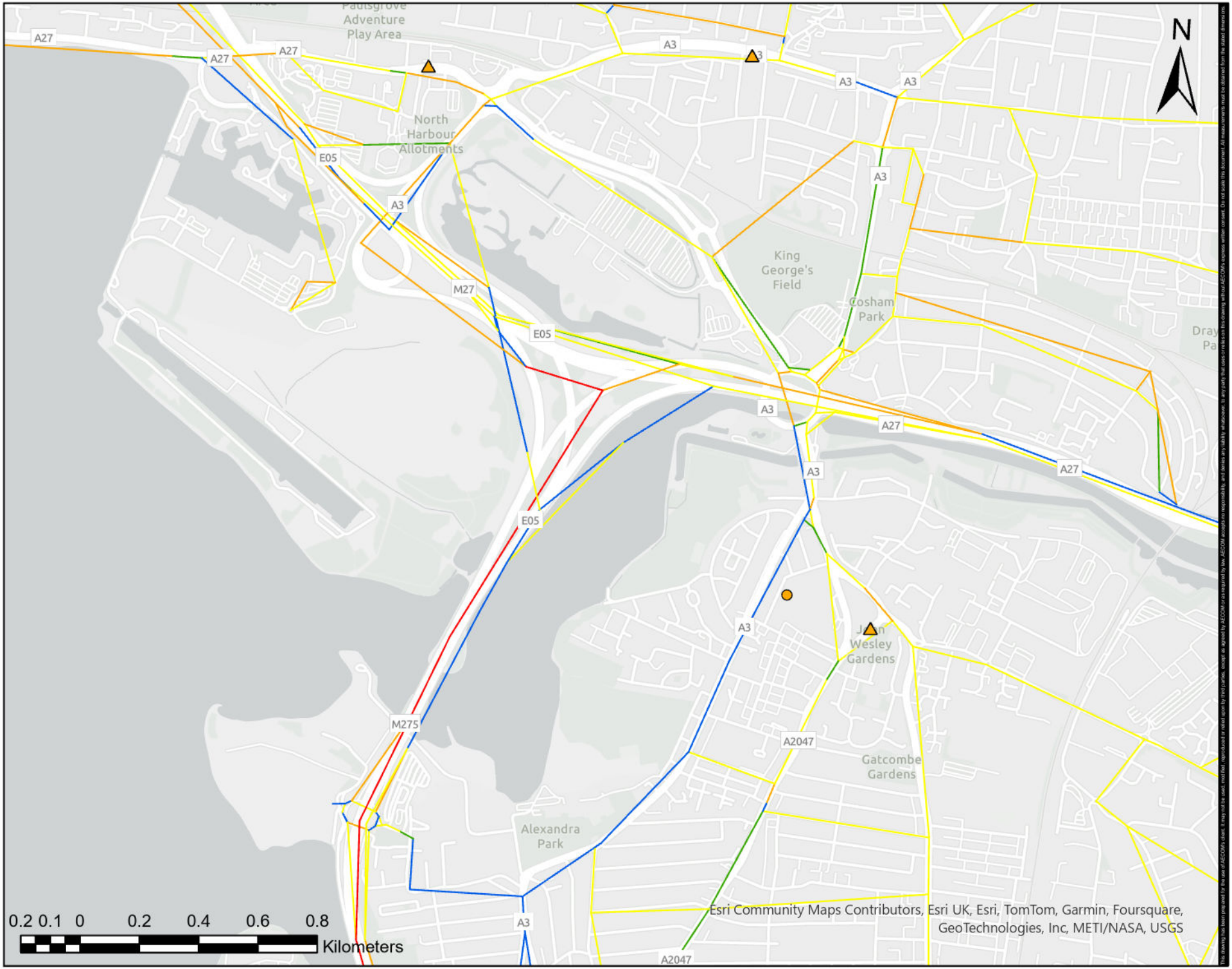
60586784

SHEET TITLE

Changes in AADT between DS2041 and DM2041 - Portsmouth City Centre

SHEET NUMBER

Figure 10



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Monitoring exceeding NO_2 AQO (µg/m^3) - Automatic Monitors
- 14.9 - 40.0
- 40.0<

Monitoring exceeding NO_2 AQO (µg/m^3) - Diffusion Tubes
- 13.5 - 40.0
- 40.0<

Change in AADT (DS2041-DM2041)
- -216 - 0
- 1 - 736
- 737 - 1392
- 1393 - 3021
- 3022 - 6652
- AQMA

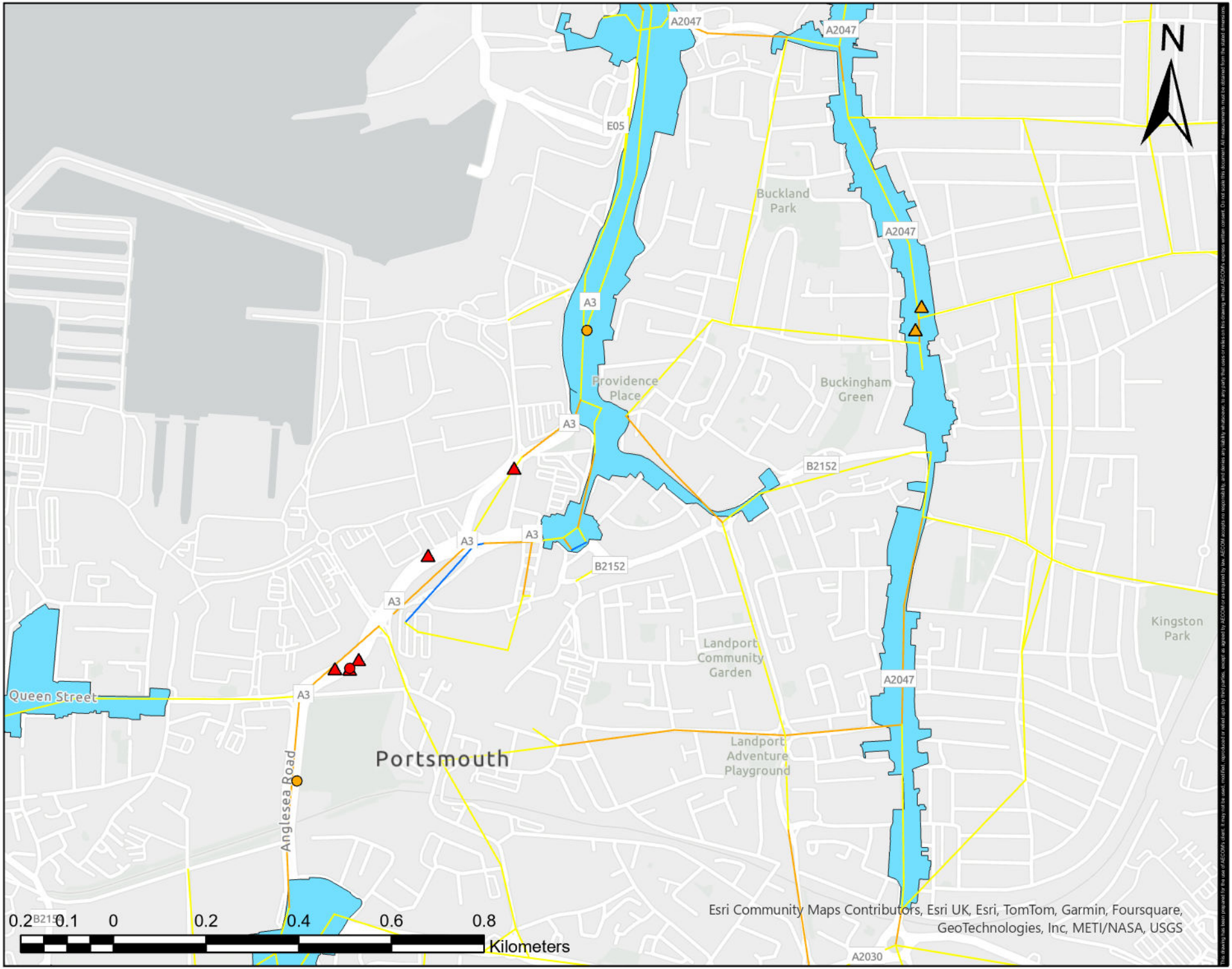
NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
Changes in AADT between DS2041 and DM2041 - Portsmouth Harbour

SHEET NUMBER
Figure 11



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT

Portsmouth Emissions Based Assessment

CLIENT

Portsmouth City Council

CONSULTANT

AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Monitoring exceeding NO_2 AQO (µg/m^3) - Automatic Monitors

- 14.9 - 40.0
- 40.0<

Monitoring exceeding NO_2 AQO (µg/m^3) - Diffusion Tubes

- 13.5 - 40.0
- 40.0<

Change in NOx Emissions (DS2041-DM2041) (kg/yr)

- -37 - 0
- 1 - 10
- 11 - 50
- 51 - 160
- 161 - 510
- AQMA

NOTES

Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE

FINAL

PROJECT NUMBER

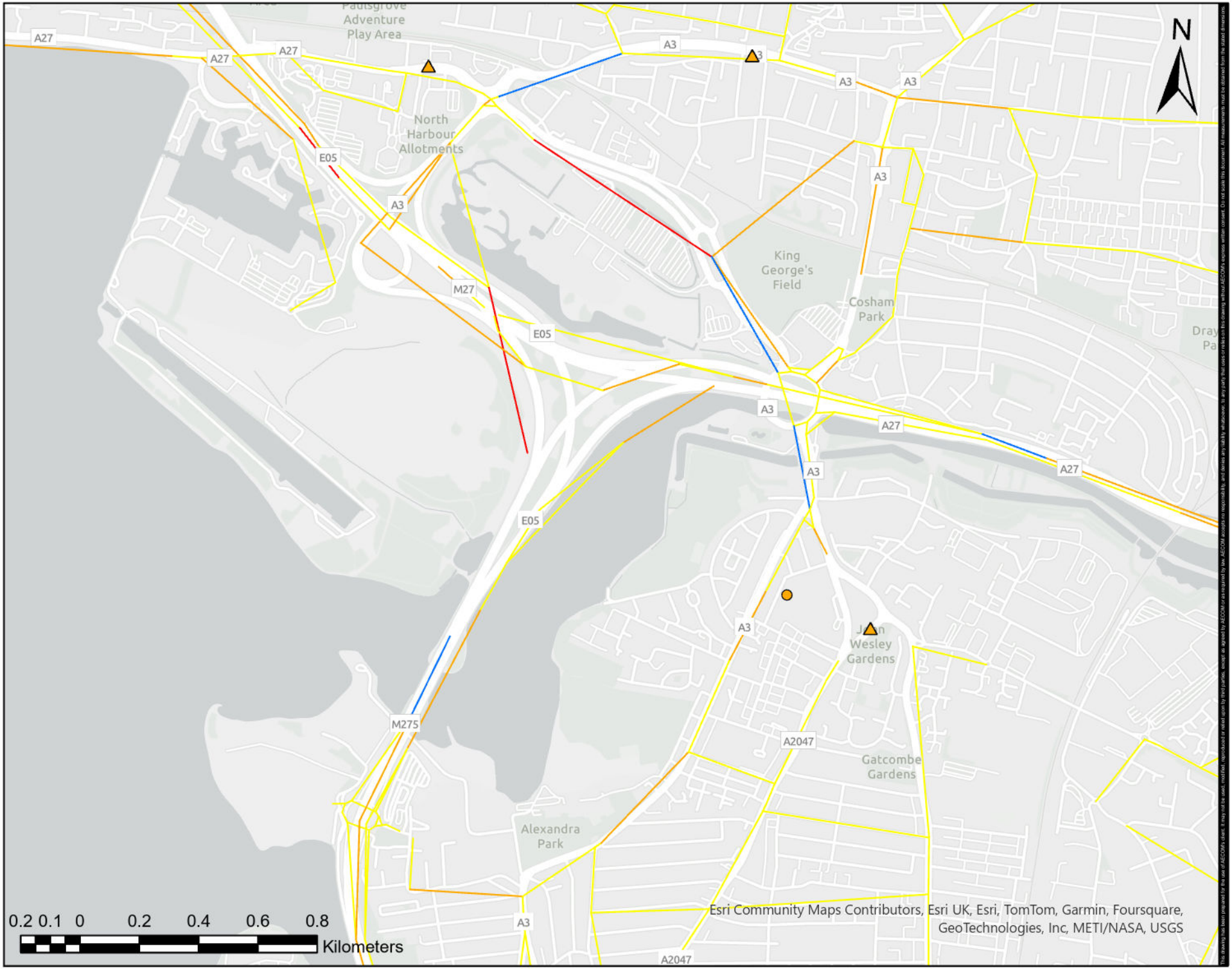
60586784

SHEET TITLE

Changes in NO_x Emissions between DS2041 and DM2041 - Portsmouth City Centre

SHEET NUMBER

Figure 12



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Monitoring exceeding NO_2 AQO (µg/m^3) - Automatic Monitors
- 14.9 - 40.0
- 40.0<

Monitoring exceeding NO_2 AQO (µg/m^3) - Diffusion Tubes
- 13.5 - 40.0
- 40.0<

Change in NOx Emissions (DS2041-DM2041) (kg/yr)
- -37 - 0
- 1 - 10
- 11 - 50
- 51 - 160
- 161 - 510
- AQMA

NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
Changes in NO_x Emissions between DS2041 and DM2041 - Portsmouth Harbour

SHEET NUMBER
Figure 13

Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Monitoring exceeding NO_2 AQO (µg/m^3) - Automatic Monitors
- 14.9 - 40.0
- 40.0<

Monitoring exceeding NO_2 AQO (µg/m^3) - Diffusion Tubes
- 13.5 - 40.0
- 40.0<

Change in NOx Emissions (DS2041-DM2041) (kg/yr)
- -37 - 0
- 1 - 10
- 11 - 50
- 51 - 160
- 161 - 510
- AQMA

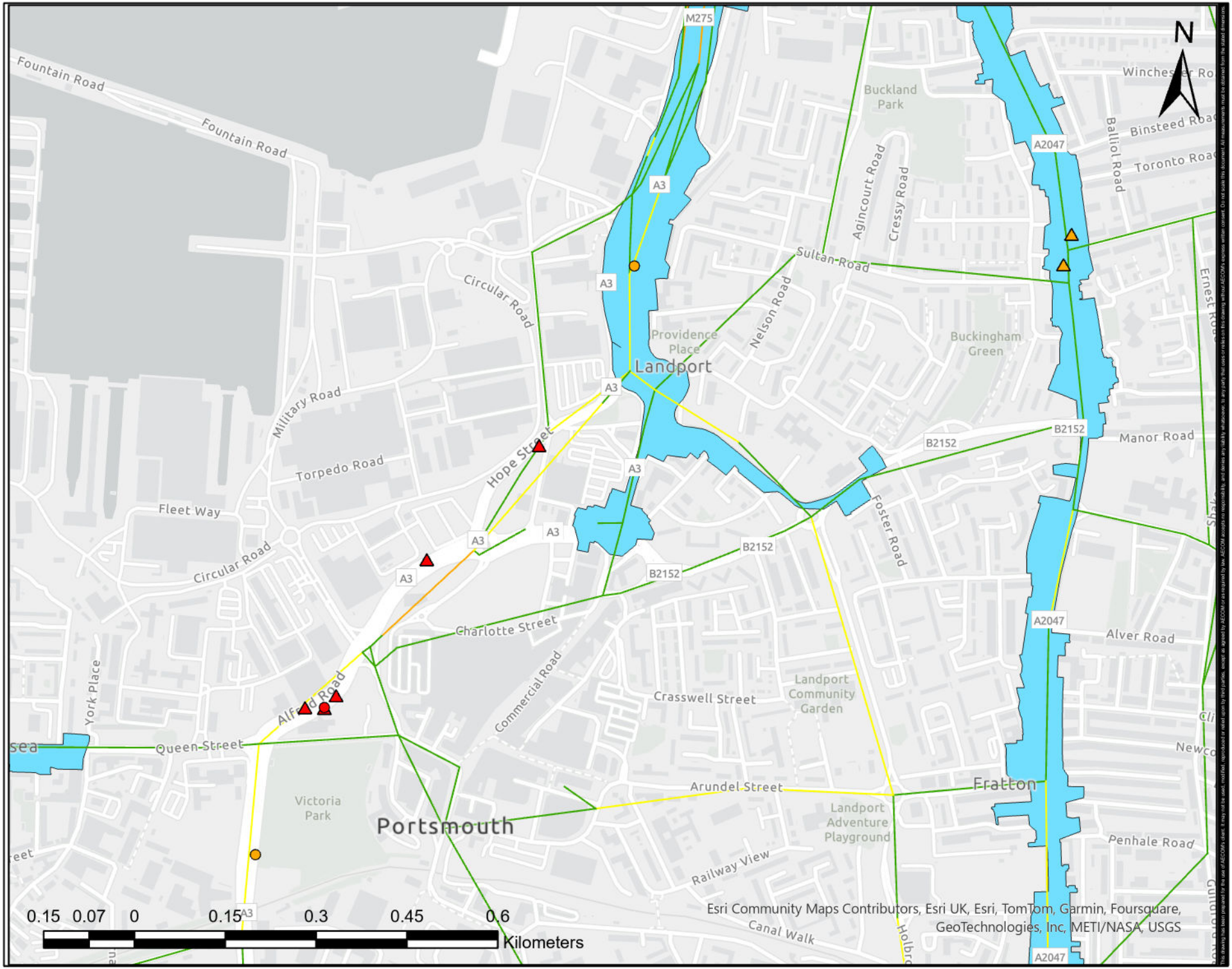
NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
Changes in NO_x Emissions between DS2041 and DM2041 - North Portsmouth

SHEET NUMBER
Figure 14



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 01/05/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Monitoring exceeding NO_2 AQO (µg/m^3) - Automatic Monitors
- 14.9 - 40.0
- 40.0<

Monitoring exceeding NO_2 AQO (µg/m^3) - Diffusion Tubes
- 13.5 - 40.0
- 40.0<

Total Annual NO_X Emissions DS2041 with Mitigation (kg/yr)
- 0 - 60
- 61 - 200
- 201 - 600
- 601 - 1600
- 1601 - 4600
- AQMA

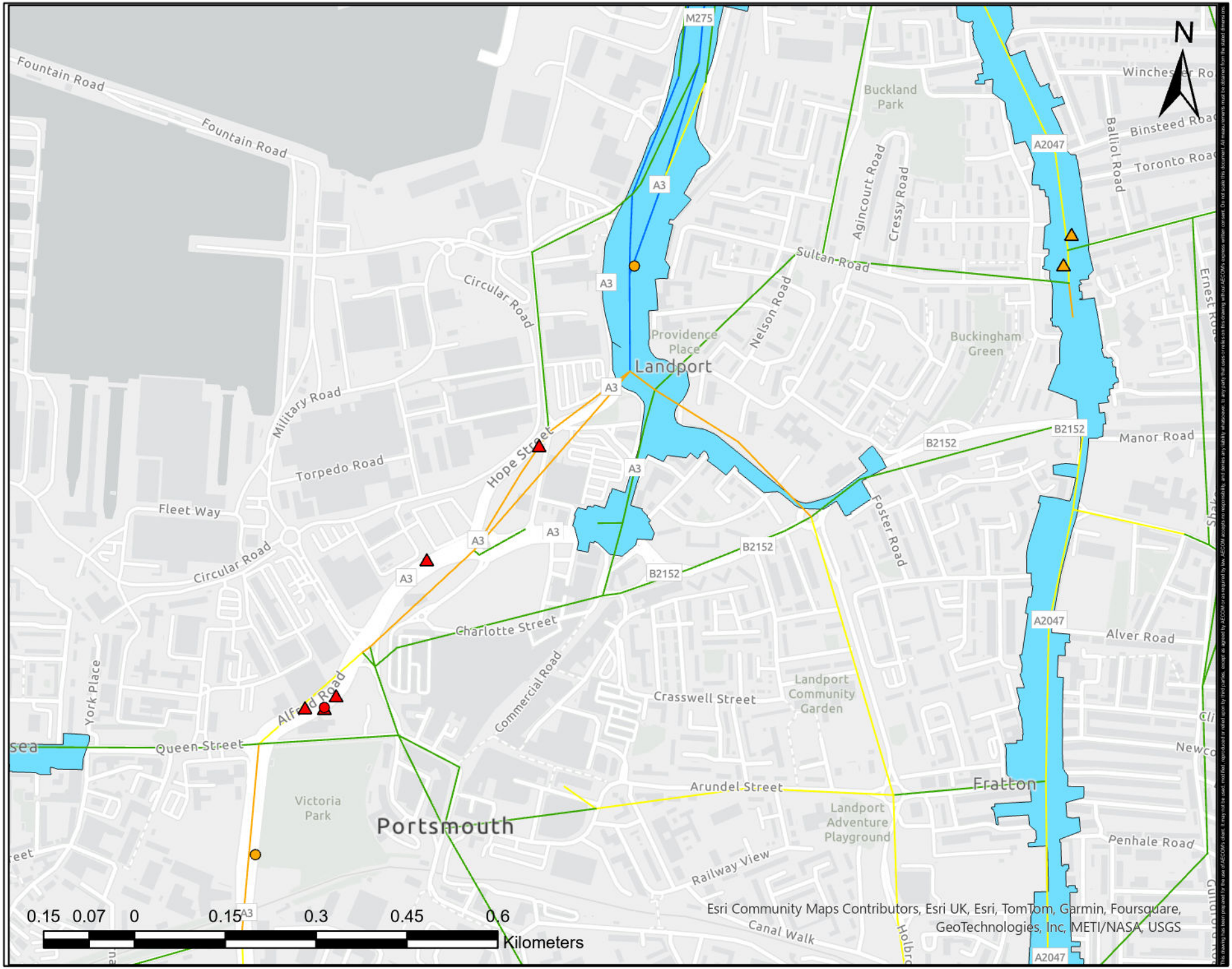
NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
Total Annual NO_X Emissions DS2041 with Mitigation - Portsmouth City Centre

SHEET NUMBER
Figure 15



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 01/05/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Monitoring exceeding NO_2 AQO (µg/m^3) - Automatic Monitors
- 14.9 - 40.0
- 40.0<

Monitoring exceeding NO_2 AQO (µg/m^3) - Diffusion Tubes
- 13.5 - 40.0
- 40.0<
- AQMA

Total AADT flow for DS2041 with Mitigation
- 0 - 5600
- 5601 - 15000
- 15001 - 30000
- 30001 - 56000
- 56001 - 90900

NOTES
Portsmouth City Council ASR 2023 and Emissions Factor Toolkit v12.0.1

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
Total AADT flow for DS2041 with Mitigation - Portsmouth City Centre

SHEET NUMBER
Figure 16

Source Apportionment - 2041

4.24 The results of the source apportionment exercise in 2041 are shown for scenarios in Appendix B in Figure 26, Figure 27 and Figure 28 but a brief breakdown of the emissions related to the major vehicle types are displayed in Table 7 .

Table 7 Average breakdown of Emissions per Vehicle Type for Baseline 2019, DM2041 and DS2041 Scenarios

Scenario	Pollutant	Percentage Contribution to Emissions by Vehicle Type								
		Petrol Cars (%)	Diesel Cars (%)	HEV + PHEV Cars (%)	BEV Cars (%)	Diesel LGVs (%)	BEV LGVs (%)	Rigid HGVs (%)	Artic HGVs (%)	Bus (%)
Baseline 2019	NO_x	9.4%	37.4%	0.3%	0.0%	27.3%	0.0%	13.6%	2.7%	5.3%
	PM_{10}	30.3%	28.9%	1.1%	0.2%	18.6%	0.0%	8.5%	3.9%	4.3%
	$PM_{2.5}$	26.3%	29.9%	1.0%	0.2%	20.7%	0.0%	9.4%	3.9%	4.5%
	CO_2	34.8%	26.1%	1.2%	0.0%	15.0%	0.0%	7.8%	5.4%	5.1%
DM2041	NO_X	22.9%	10.4%	6.6%	0.0%	29.2%	0.0%	11.4%	6.8%	3.1%
	PM_{10}	20.5%	9.1%	9.0%	13.1%	16.2%	2.5%	6.1%	4.3%	1.9%
	$PM_{2.5}$	19.8%	8.9%	9.1%	13.9%	15.9%	2.4%	6.2%	4.6%	1.9%
	CO_2	26.6%	11.6%	10.0%	0.0%	20.3%	0.0%	8.7%	7.3%	3.0%
DS2041	NO_X	22.6%	10.3%	6.3%	0.0%	28.7%	0.0%	12.1%	7.1%	3.4%
	PM_{10}	20.6%	9.2%	9.0%	13.0%	16.3%	2.5%	6.0%	4.2%	1.9%
	$PM_{2.5}$	19.8%	8.9%	9.1%	13.9%	16.0%	2.4%	6.1%	4.5%	1.8%
	CO_2	26.8%	11.7%	9.9%	0.0%	20.3%	0.0%	8.7%	7.3%	3.0%

Note: Some vehicle classes have been excluded so total is not add up to 100%. HEV + PHEV = Hybrid Vehicles, BEV = Battery Electric Vehicle, LGVs = Light Goods Vehicles and HGVs = Heavy Goods Vehicles

4.25 The breakdown of NO_X emissions by vehicle type is given for specific areas of interest in the sections below. This includes North/Northwest, AQMAs in Portsmouth City Centre and major roads going in and out of Portsmouth. For the other pollutants, the data in Table 7 shows that petrol cars were the largest contributor to CO_2 and PM_{10} emissions in 2019, DM2041 and DS2041. Diesel and petrol cars were significant contributors to $PM_{2.5}$ emissions in 2019 and by 2041 were lower contributors. The contribution to $PM_{2.5}$ from electric vehicles increased significantly in 2041, due to an increase from non-exhaust sources from these vehicles. Overall, emissions from diesel vehicles decreased for all pollutants from 2019 to 2041.

North/Northwest Portsmouth

4.26 There are a number of roads near Portsmouth Harbour in North/Northwest of Portsmouth where there is predicted to be a notably large increase in road NO_X emissions with the Local Plan in place, including a section of the M27, slip road, M275 and the A27/A3 roundabout (see Figure 13).

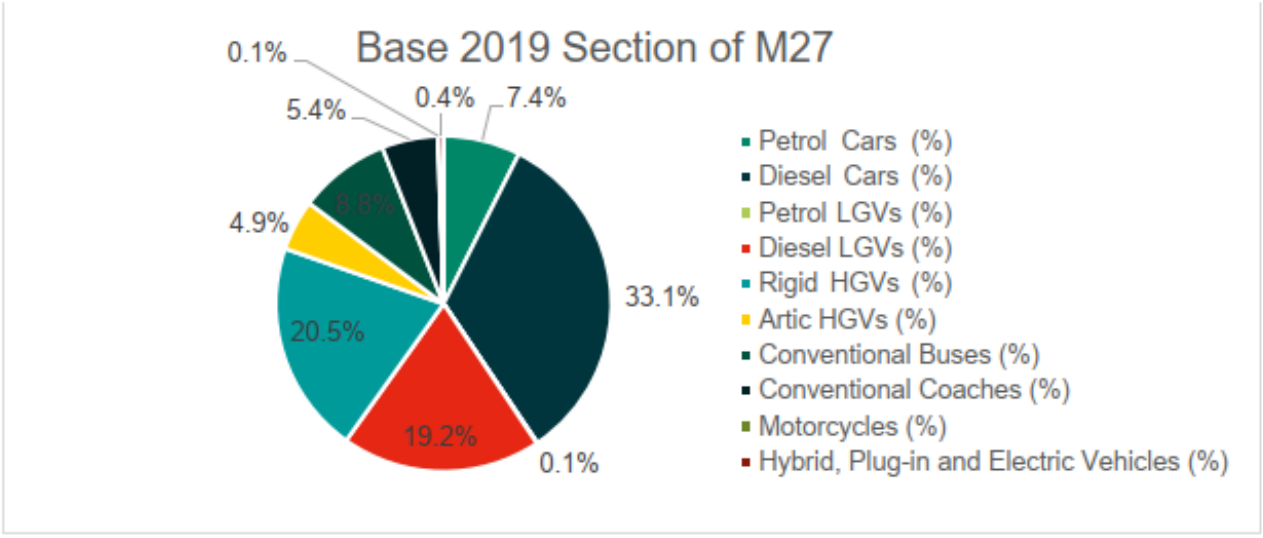
4.27 Examples of the breakdown of NO_X emissions from vehicle types in this area is shown in Figure 17 and Figure 18.

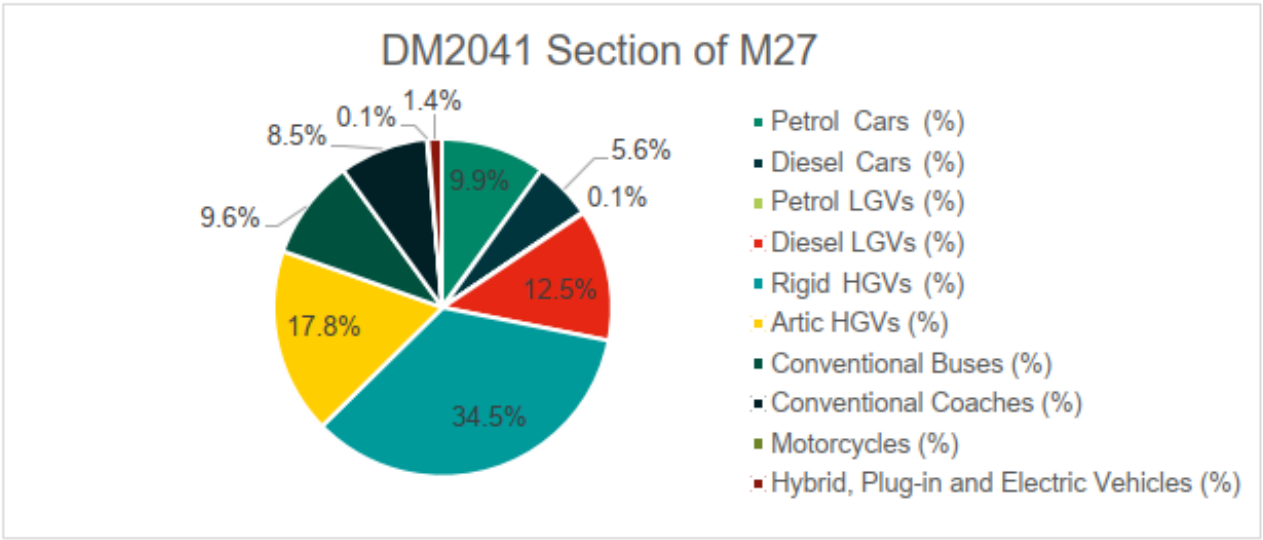
4.28 Along a section of the M27 road, the largest contribution to NO_X emissions in DM2041 and DS2041 are predicted to be from rigid HGVs which increases from 34.5% to 36.8%. The traffic data provided by Systra

shows that based on a reduction in diesel cars, the percentage emission contribution from these is predicted to decrease from 5.6% without the Local Plan to 4.0% with the plan. This is approximately an 85% overall decrease from 2019 due to the shift to electric vehicles.

4.29 On the M27 slip road, the largest contribution is from diesel LGVs at 26.0% without the Local Plan and rigid HGVs at 22.6% with the plan. The percentage contribution from diesel cars is predicted to decrease from 12.8% to 11.0%. This is approximately a 70% decrease from 2019.

Figure 17 Breakdown of NO_X Emissions per Vehicle Type for Baseline 2019, DM2041 and DS2041 Scenarios – Section of M27 (NW Portsmouth)





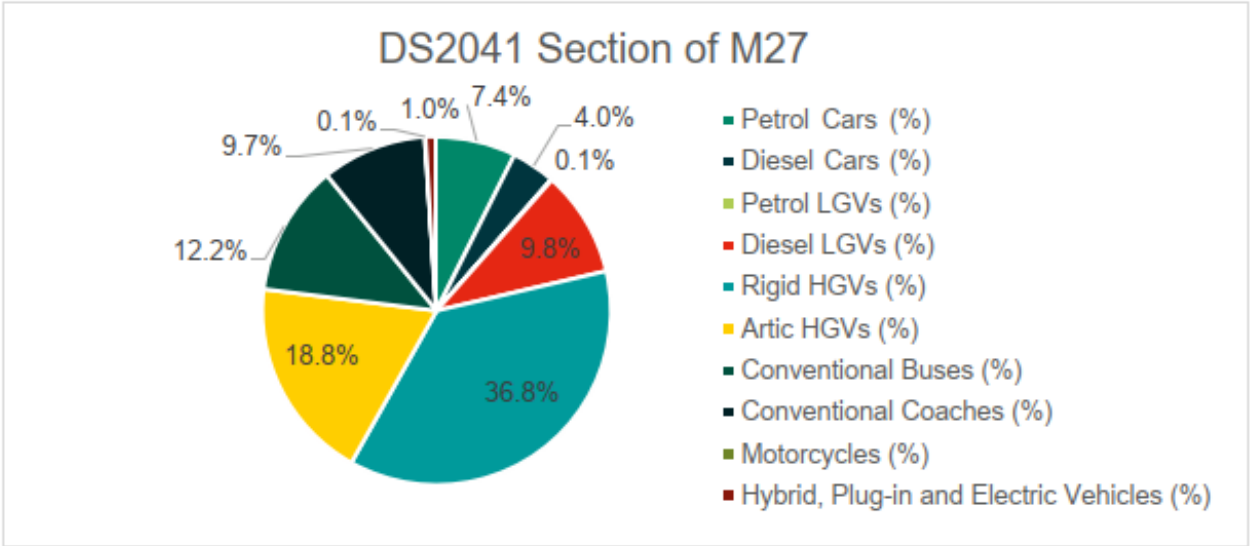
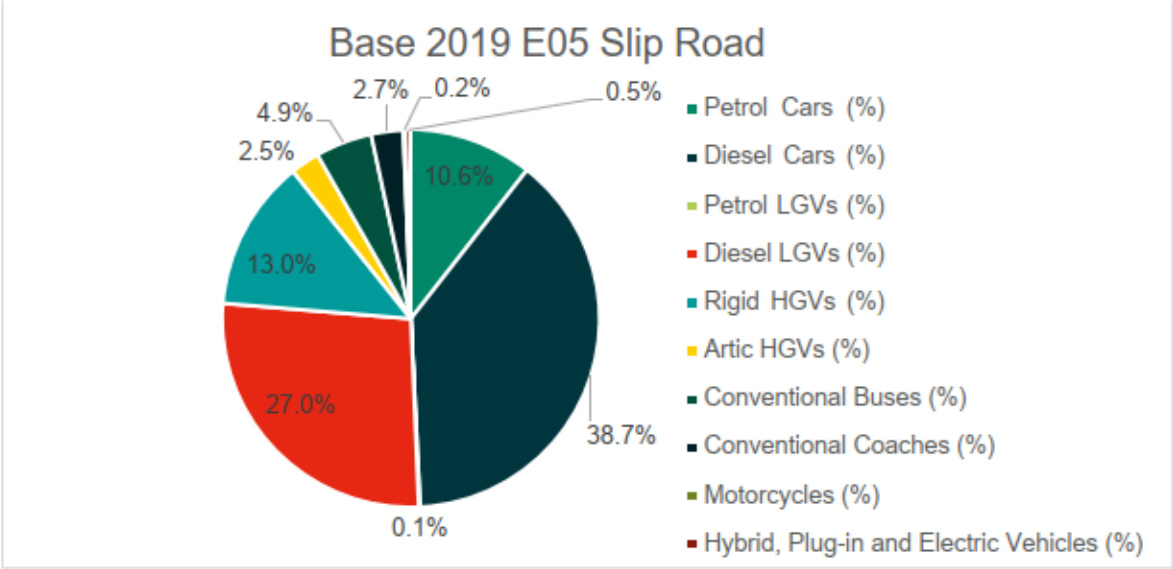
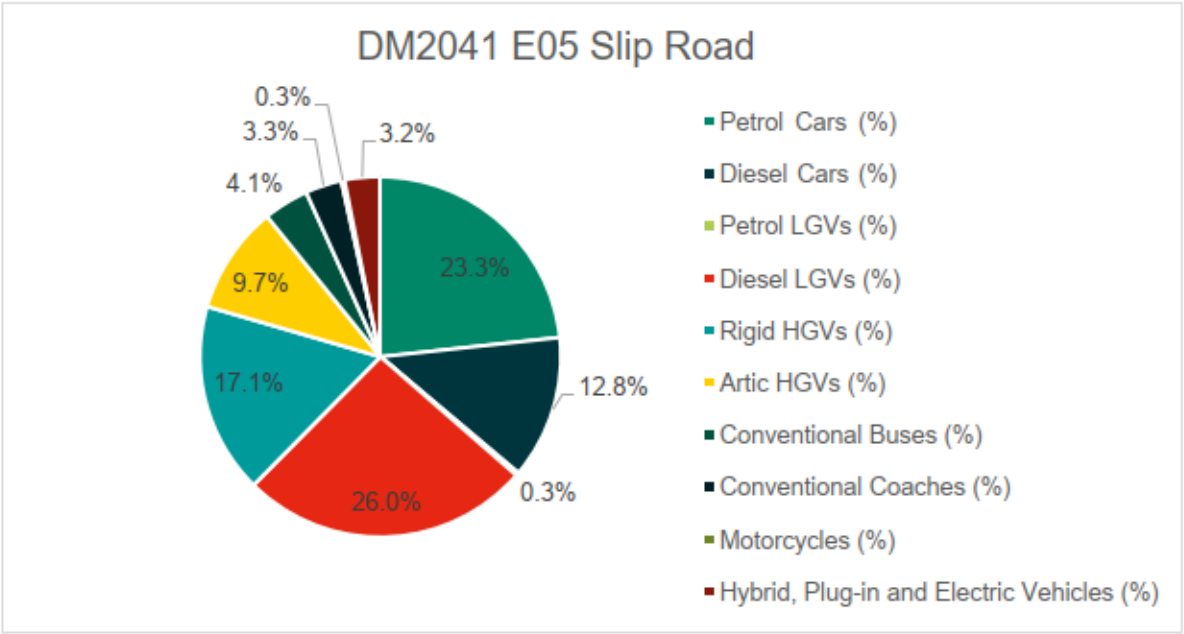
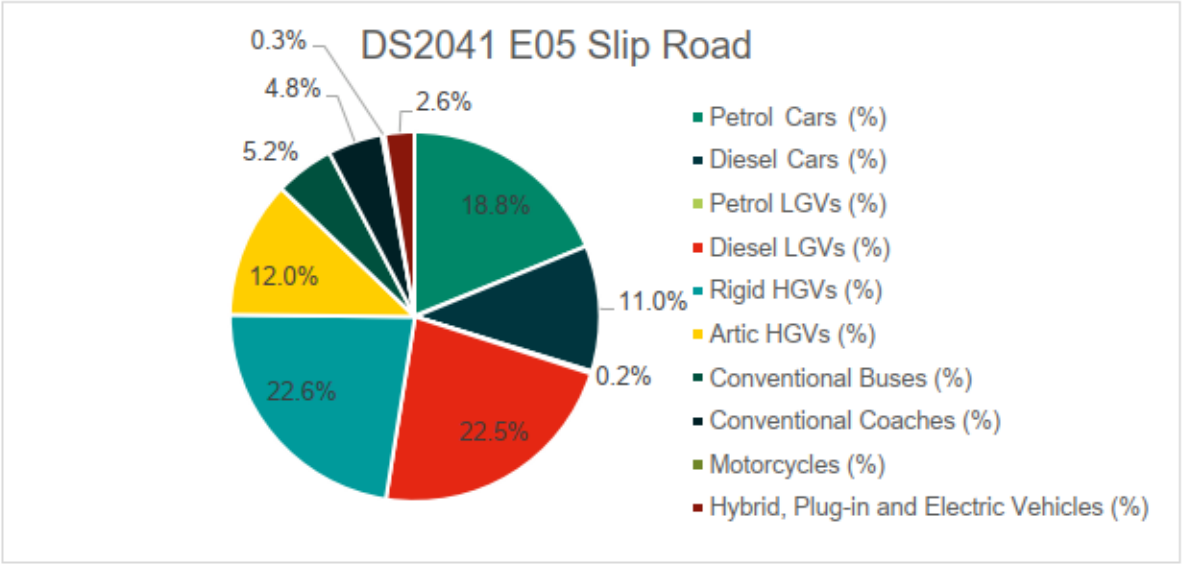


Figure 18 Breakdown of NO_X Emissions per Vehicle Type for Baseline 2019, DM2041 and DS2041 Scenarios – E05 Slip Road (NW Portsmouth)







Portsmouth City Centre

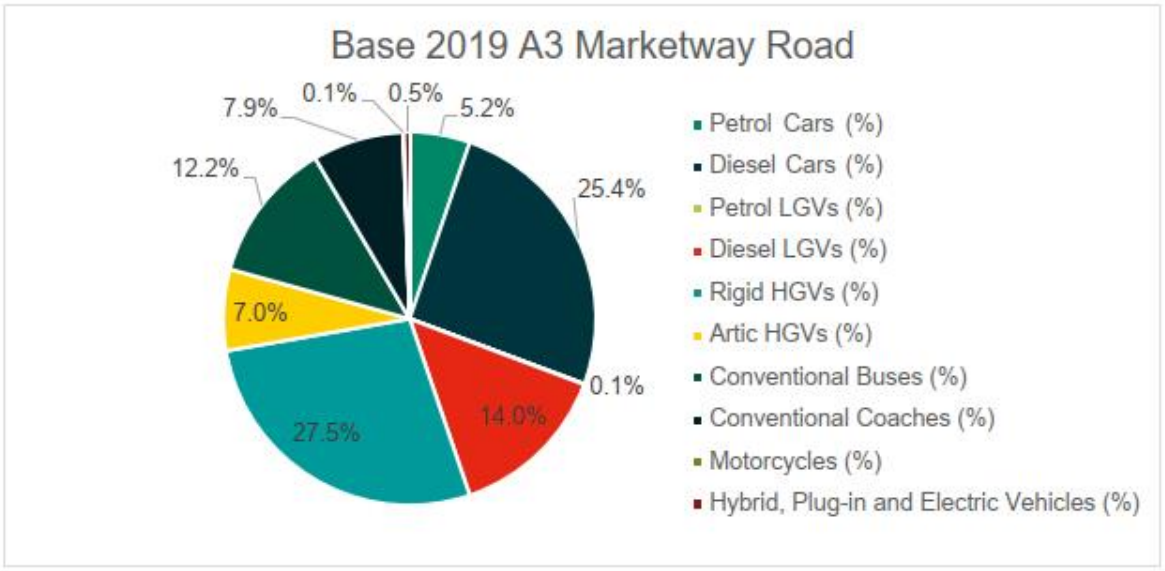
4.30 There are several roads in the City Centre where there was predicted to be a notably large increase in road NO_X emissions with the Local Plan in place, including Marketway roundabout and Commercial Road, which are both located in AQMA 11 (see Figure 12). Monitoring on Alfred Road and Hope Street show that levels of NO_2 are highest in this area, with concentrations remaining above the objective in 2022, with some areas seeing an increase in 2022. Although NO_x emissions were predicted to substantially decline from current levels by 2041, this is still a potential area of concern if levels do increase due to traffic associated with new developments.

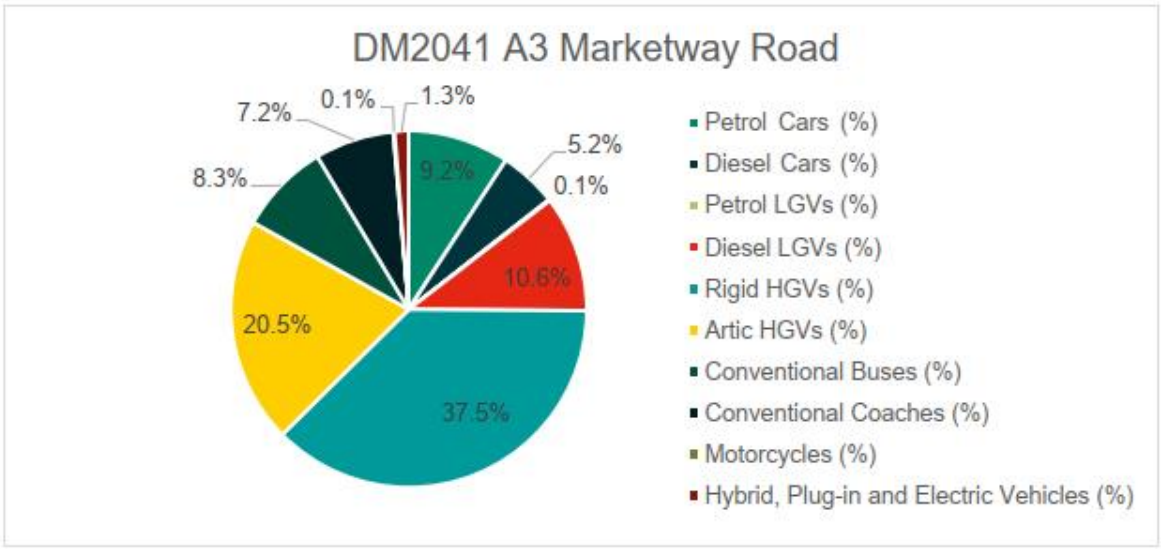
4.31 Examples of the breakdown of NO_X emissions by vehicle type in this area are shown in Figure 19 and Figure 20.

4.32 On A3 Marketway, the largest contribution in DM2041 and DS2041 is from emissions from rigid HGVs which increase from 37.5% to 43.6%. Using the traffic data provided, the percentage emission contribution from diesel cars is found to decrease to 5.2% in DM2041 and 0.9% in DS2041 from 2019, which is approximately an 85% reduction.

4.33 On A3 Commercial Road, the largest emission contribution in DM2041 and DS2041 is from diesel LGVs which reduce from 31.2% to 26.6%. The percentage contribution from diesel cars is predicted to decrease to 14.2% in DM2041 and 13.2% in DS2041, a 68% decrease from 2019.

Figure 19 Breakdown of NO_X Emissions per Vehicle Type for Baseline 2019, DM2041 and DS2041 Scenarios – A3 Marketway Road (Portsmouth City Centre)





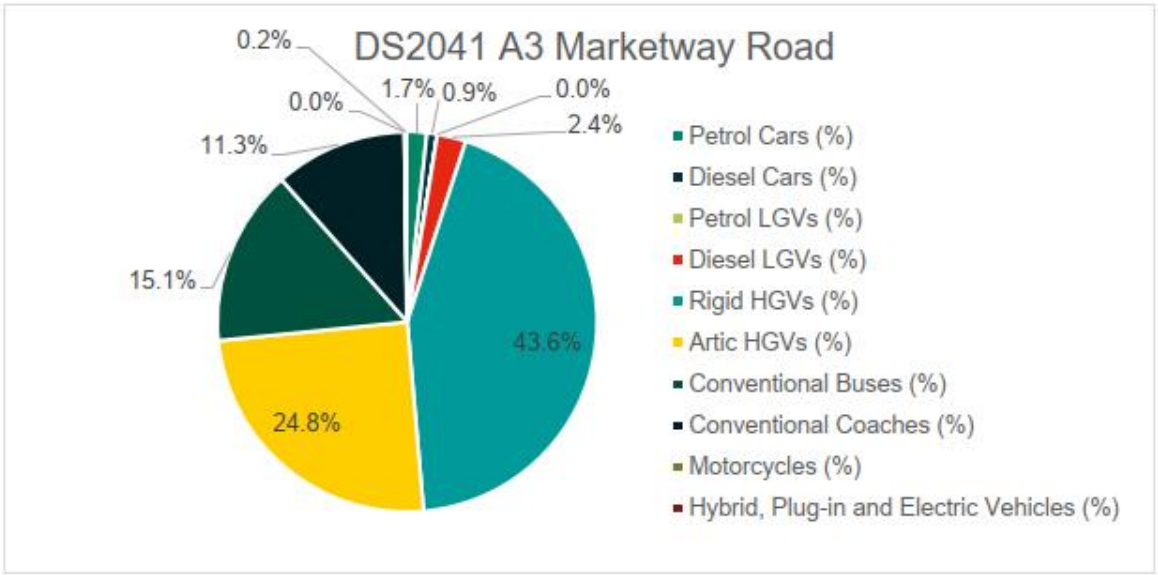
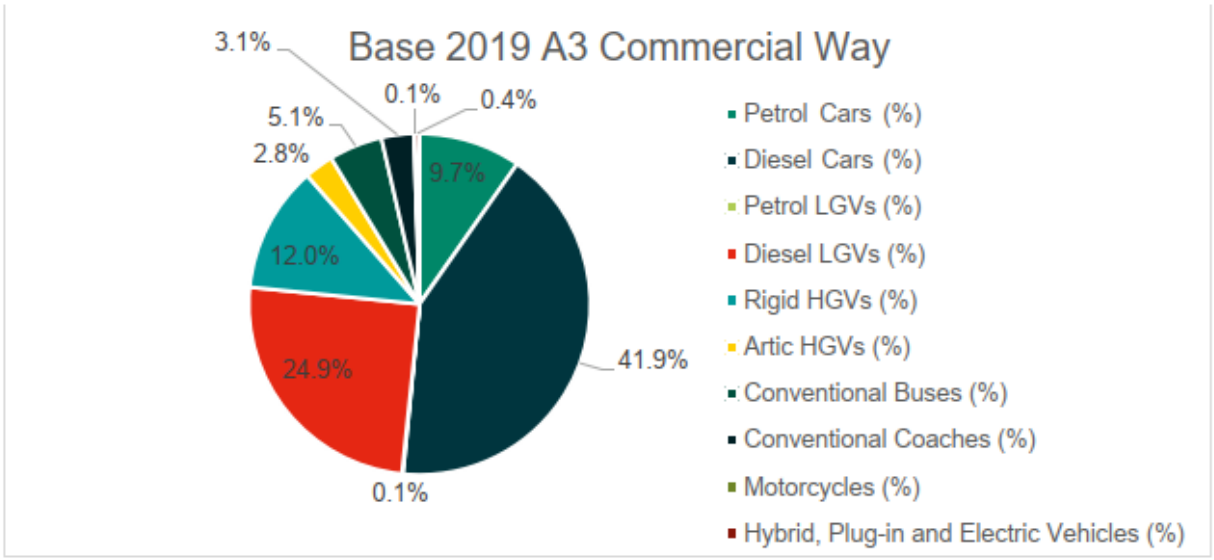
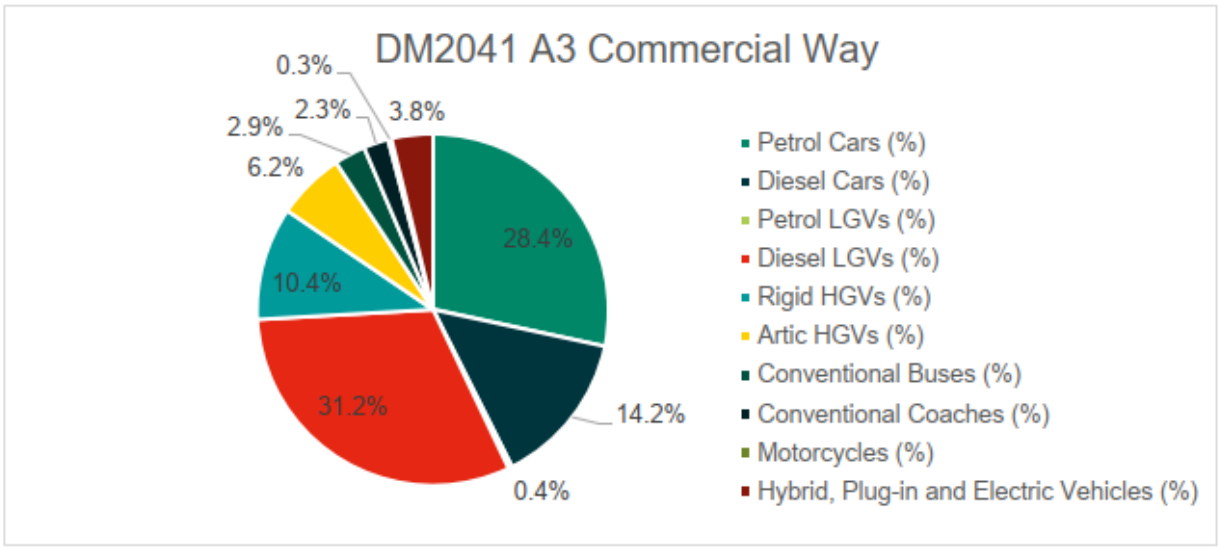
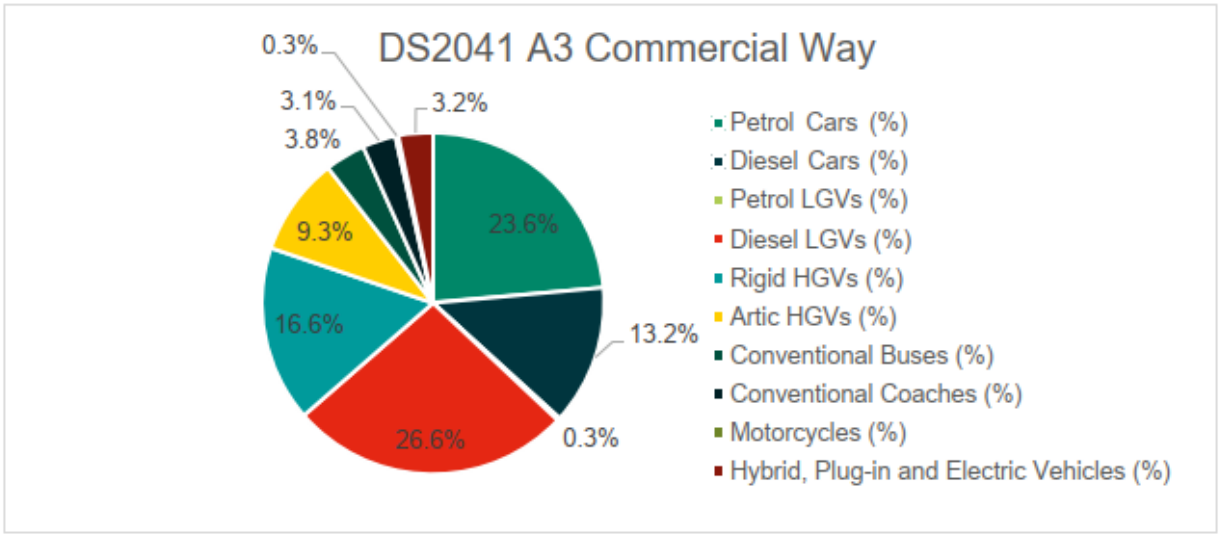


Figure 20 Breakdown of NO_X Emissions per Vehicle Type for Baseline 2019, DM2041 and DS2041 Scenarios – A3 Commercial Road (Portsmouth City Centre)







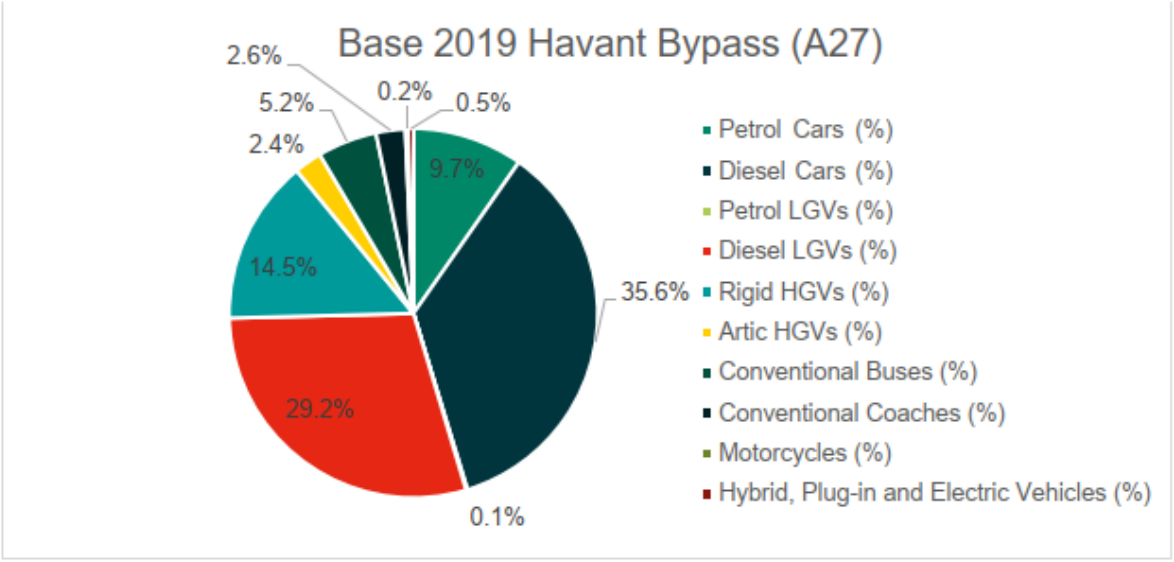
North/Northeast Portsmouth

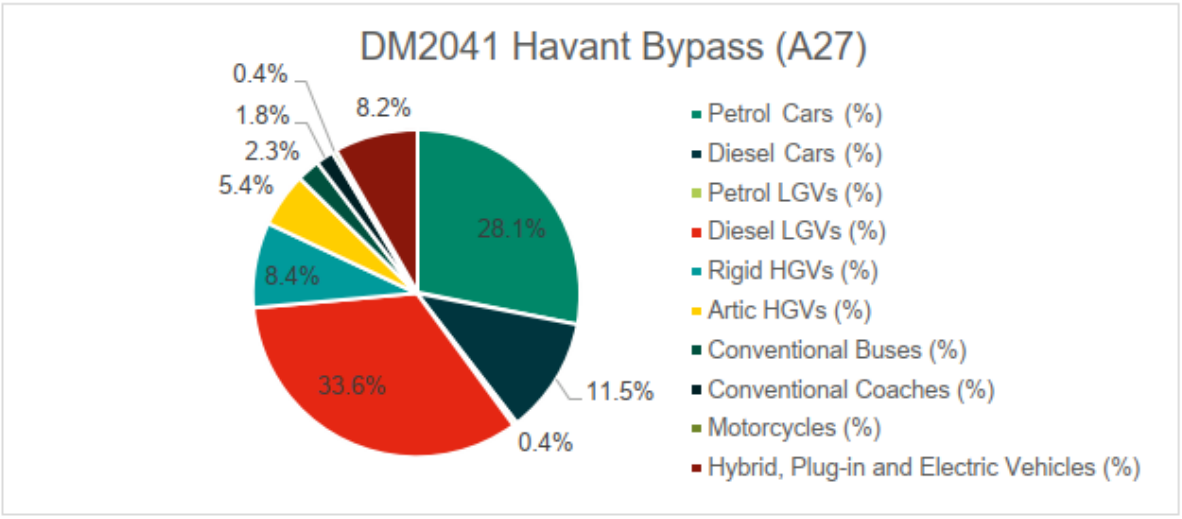
4.34 In the North to Northeast of Portsmouth, there are quite a few notably large increases in NO_X emissions between scenarios DM2041 and DS2041. These areas of concern are located along Havant Bypass (A27) and the A2030. The breakdown of NO_X emissions by vehicle type for these roads is shown in Figure 21 and Figure 22.

4.35 Along a section of Havant Bypass (A27), north of the Hilsea area but still within Portsmouth, the largest emission contributor in DM2041 and DS2041 are predicted to be diesel LGVs at 33.6% and diesel LGVs at 32.2%. The percentage contribution from diesel cars is predicted to be similar with and without the Local Plan (around 11.5%), approximately a 70% decrease from the 2019.

4.36 Along a section of Eastern Road A2030, the largest emission contributor in DM2041 and DS2041 are predicted to be rigid HGVs, increasing from 32.5% to 35.1%. The percentage emission from diesel cars is predicted to decrease to 7.2% in DM2041 and 5.4% in DS2041, approximately an overall 80% reduction from 2019.

Figure 21 Breakdown of NO_X Emissions per Vehicle Type for Baseline 2019, DM2041 and DS2041 Scenarios – Havant Bypass (A27) (NE Portsmouth)





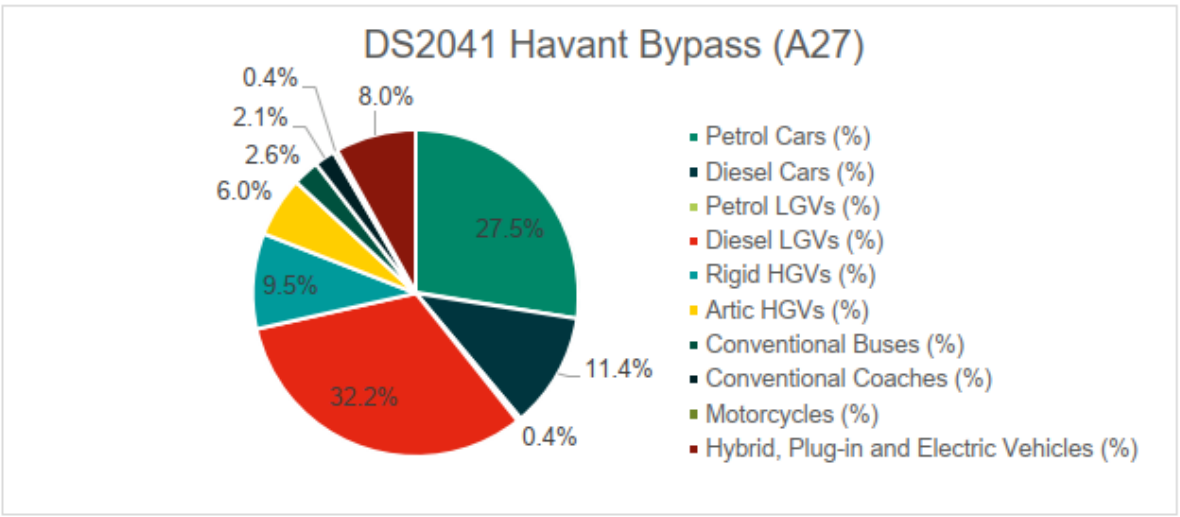
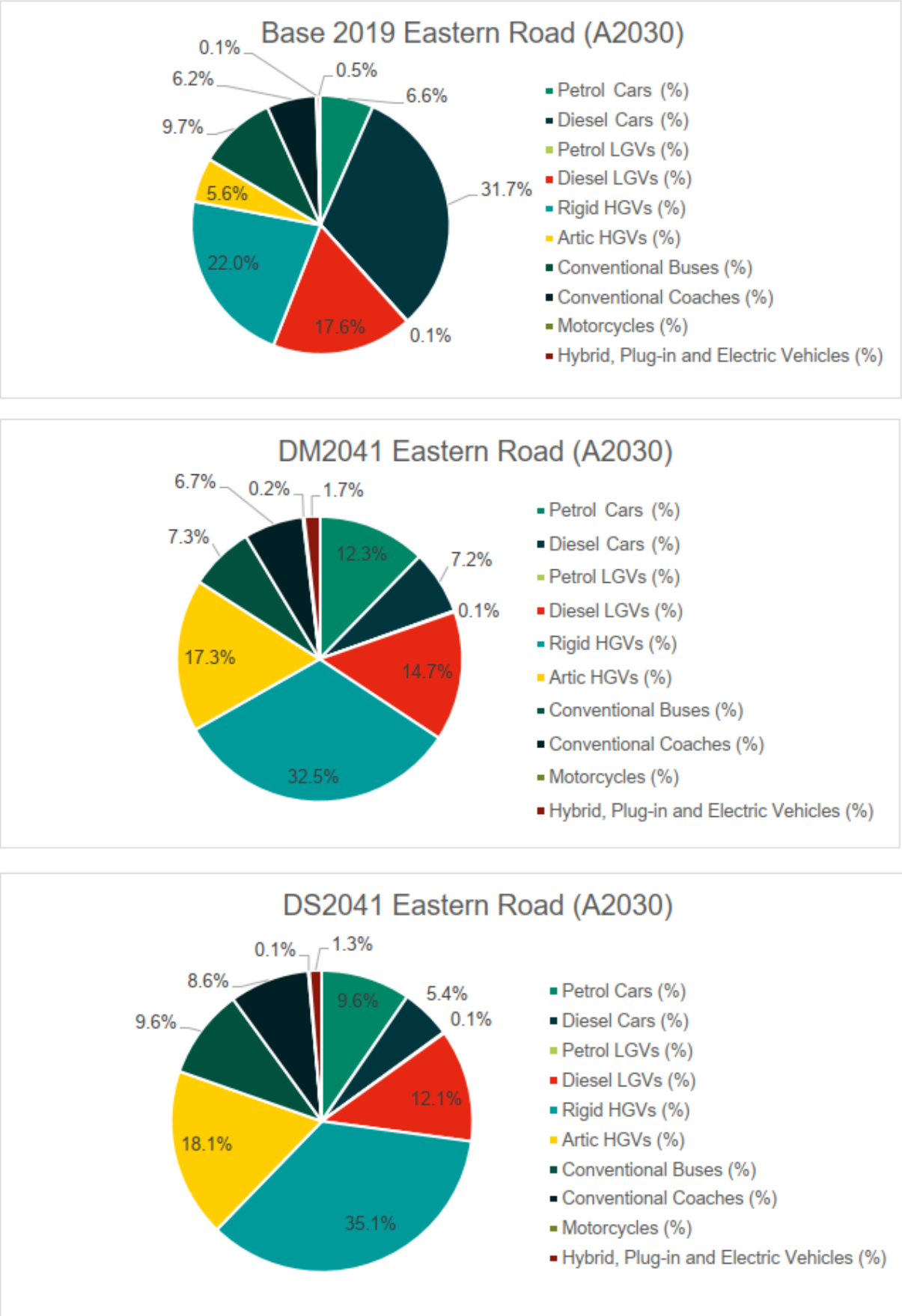


Figure 22 Breakdown of NO_X Emissions per Vehicle Type for Baseline 2019, DM2041 and DS2041 Scenarios – Eastern Road (A2030) (NE Portsmouth)



5. Monetary Appraisal

5.1 There are various published methodologies that can be used to assign a monetary value to the air quality impacts of schemes or plans to further understand the potential costs or benefits to society. The damage cost appraisal is one of these methodologies that assigns an economic impact per tonne of emissions[10].

5.2 A damage cost appraisal was used to consider the impact of the Local Plan (without mitigation) between the baseline year of 2019 and future year of 2041. With the absence of data for intermediate years, the appraisal assumed a linear interpolation of the predicted total emissions between the two modelled years for the 22-years appraisal period. During this time the change in emissions was attributed to the Local Plan build out and changes to the traffic fleet, where the economic valuation per tonne of each pollutant was also predicted to change due to inflation and discounting factors defined by the guidance. It is assumed that trends (either beneficial or detrimental) would continue beyond 2041, although this was not modelled and so have not been presented here.

5.3 Damage costs can be used to provide a monetary valuation for greenhouse gases (CO_2) as provided by the Department for Transport (DfT)[11] and for local pollutants (NO_X and $PM_{2.5}$) as provided by Defra[12].

Greenhouse Gas Appraisal

5.4 The overall assessment score is provided in terms of a central figure that represents the Net Present Value (NPV) of CO_2 equivalent emissions. This central value was calculated as **£13,778,872**, which is a net benefit to the Local Plan. This ranges from a lower estimate of **£6,889,436** to an upper estimate of **£20,668,307** NPV.

5.5 This valuation is based on a change in CO_2 of **-132,825 tonnes** of CO_2 over a 22-year appraisal period (from 2019 - 2041).

5.6 The emissions of CO_2 are split between the 'traded sector' and the 'non-traded sector'. The traded sector covers emissions from power and heat generation and electricity production consumed in transport, which is assumed to be from renewable sources or otherwise compensated by carbon trading schemes. The non-traded sector covers all other carbon emissions, including tailpipe emissions from the consumption of other types of transport fuel, including petrol, diesel and gas oil[13]. Of the traded emissions alone, the benefit is **£224,749** for the full 22-year appraisal period of the Local Plan build-out**.**

Local Air Quality Appraisal

5.7 Based on valuations per tonnes of pollutants, calculations were conducted to determine the total impacts of the appraisal period. Table 8 displays the results of the monetary valuation for local air quality pollutants.

Table 8 Local Air Quality Appraisal

Pollutant	Low Sensitivity NPV	Central NPV	High Sensitivity NPV
NO_x from road transport	£39,435	£236,854	£910,872
$PM_{2.5}$ from road transport	£354,888	£894,800	£2,569,211

5.8 The 'low sensitivity' and 'high sensitivity' values are included in the results as they demonstrate different health impact pathways, and differences in the valuation of a life year. The positive values for local air quality benefits suggest a net benefit is expected with the Local Plan. It is noted that the EFT does not calculate traded values for emissions from HDVs and so the calculation excludes the higher emissions from power generation resultant from increased vehicle charging of electric vehicles in the future.

[10] https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance
[11] https://www.gov.uk/government/publications/tag-unit-a3-environmental-impact-appraisal
[12] https://www.gov.uk/government/publications/assess-the-impact-of-air-quality
[13] https://assets.publishing.service.gov.uk/media/65ae62ff75154600107b4acb/tag-unit-a3-environmental-impact-appraisal.pdf

6. Conclusions

6.1 This report presents the methodology and findings of an emission-based assessment conducted by AECOM Ltd on behalf of Portsmouth City Council (PCC) to consider the potential impacts of traffic related changes associated with the Council's Local Plan 2041.

6.2 The study provided a high-level assessment of total road traffic related NO_X, particulate and CO_2 emissions across Portsmouth as well as a breakdown of emissions by vehicle type. Totals and changes in emissions from a baseline year of 2019 to the future year of 2040 with, and without, the Local Plan in place were calculated.

6.3 The study concluded that there would be an overall reduction in CO_2 emissions from 2019 to 2041 of 22.4% due to the improvements in vehicle fleet between this 22-year period. In addition, the Local Plan would lead to a reduction of CO_2 with a net monetary benefit of £13,778,872 for the 22-year appraisal period.

6.4 Similarly, to predicted reductions in CO_2 emissions, NO_x emissions in 2041 are predicted to be much lower than in 2019 by 84.8%. The traffic modelling outputs predicted an overall increase in traffic flow with the Local Plan (without mitigation) in place 2041 by 579,000 km, but total NO_X emissions across the Portsmouth administrative area were predicted to reduce. This overall small reduction in emissions is understood to be due to re-routing of vehicles on the road network and improvements in congestion (which has affected modelled speeds) due to the planned development in the Local Plan. This reduction in NO_X emissions resulted in a net benefit of the Local Plan of £236,854 (central value) over 22-years.

6.5 The study also found that future $PM_{2.5}$ emissions will be relatively similar to what they currently are in 2019, with relatively little improvements by 2041 due to non-exhaust emissions that are not altered by the shift to electrified technologies. However, the high economic value attributed to emissions still led to a benefit of £894,800 (central value) for the 22-year appraisal period of the Local Plan build-out.

6.6 When assessing the impacts of the Local Plan with Mitigation scenario, it was found that there would be a slight increase in emissions of NO_X, PM_{10}, $PM_{2.5}$ and CO_2 compared to the Local Plan scenario without mitigation. Specifically, total annual NO_X emissions are expected to increase by 2%, PM_{10} by 4%, $PM_{2.5}$ by 5% and CO_2 by 5%. These increases in emissions can be attributed to the changes in road layouts particularly in the City Centre, where roads such as Hope Street, which were originally one way are planned to be converted to two way as part of the City Centre scheme. This results in an increase in vehicle kilometres travelled across the network.

6.7 The City Council recognises the slight increase in emissions of NO_X, PM_{10}, $PM_{2.5}$ and CO_2 compared to the Local Plan scenario without mitigation. The Council is revisiting the approach to the road layout at City Centre North jointly with the site promotor. This work will consider several aspects of the City Centre North Scheme including; revisions to the road layout; car (parking) availability in the City Centre North site; Mode shift assumptions; displacement of trips to the Tipner Park and Ride and approach to the inclusion of the Bus Service Improvement Plan. This work is expected to be undertaken in the Autumn of 2024, and will include revised air quality modelling to ascertain the impact of these interventions. The work is intended reach a solution that ensures that development does not worsen air quality.

6.8 As mentioned previously, although current particulate concentrations meet the relevant AQOs, in the future $PM_{2.5}$ specifically will become more of a priority, the contribution from non-exhaust emissions from tyre or brake wear may increase as vehicles get heavier. In addition, ambient targets are likely to become more stringent. Strategies that are focused on this pollutant are likely to be a future focus for the PCC and Government. For example, there is some early research being conducted by Department for Transport into tyres that minimise particulate emissions while maintaining road safety.

6.9 Another key outcome of the study is that there are several key areas and roads that have been identified where the predicted increase in traffic also led to an increase in emissions a result of proposed development allocations in the Local Plan. The impacts of these changes have been considered alongside existing monitored pollutant concentrations, exceedances of the AQOs, locations of residential exposure and levels of deprivation. These areas are discussed below, and it is recommended that PCC consider if

further detailed assessment is required to understand how the changes in emissions affect concentrations and the ability to comply with AQOs[14].

6.10 In terms of ecological habitats, an associated study of Local Plan impacts show that saltmarsh are the only habitat that could be subjected to increased nitrogen deposition. These are being assessed as part of the HRA for Regulation 19 but include the following locations:

- Approx. 164m from the A32 in the Portsmouth Harbour SPA / Ramsar;
- Approx. 36m from the A27 / A3 interchange (Havant Borough junction) in the Chichester and Langstone Harbours SPA/Ramsar; and;
- Adjacent to the A2030 in the eastern part of Portsmouth City in the Solent Maritime SAC.

Portsmouth City Centre

6.11 There are a number of roads in the City Centre where there are expected to be increases in NO_X emissions with the Local Plan in place in 2041 including around Cascades Shopping Centre and Marketway. These increases are likely to be due to traffic associated with proposed development sites extending from Church Street roundabout all the way south to the University of Portsmouth.

6.12 These roads are key areas of concern, as despite being within the CAZ, measured NO_2 concentrations remain high. For example, exceedances of the NO_2 annual mean AQO remain along Alfred Road, Hope Street and Marketway in 2022. As well as having the highest levels of pollutants, these areas also have a relatively high level of residential density with significant social deprivation. Therefore, it is a key area to focus on for further improvements and study.

6.13 The Local Plan with Mitigation scenario is predicted to lead to further increase in vehicle kilometres travelled and an associated increase in emissions due to the City Centre plans, specifically around Hope Street where there are exceedances of the annual mean AQO.

6.14 The Council is revisiting the approach to the road layout and mitigations at City Centre North in the Autumn of 2024 This work will include revised air quality modelling to ascertain the impact of these interventions. The work is intended reach a solution that ensures that development does not worsen air quality.

North of Portsmouth Harbour

6.15 In the north of Portsmouth Harbour, traffic flows are expected to increase with the Local Plan in place, whilst overall total annual NO_X emissions expected to decrease. However, there are a few roads in and around Cosham where there are expected to be increases in NO_X emissions. These were specifically predicted to be around Port Solent, the A3/M27 in Hilsea and the A27 North of Lakeside in Cosham. This area of Portsmouth is also largely deprived as well, and is an area proposed for development in the Local Plan.

6.16 The A3 surrounding Alexanda Park to the Northeast, is also an area where large increases in traffic flows and associated emissions were predicted with the Local Plan. However, nearby monitoring data from Gatcombe Primary School monitoring site and diffusion tube (DT 273) suggest that in 2022, NO_2 concentrations were not exceeding the annual mean AQO. Therefore, these increases in emissions predicted are unlikely to lead to any future exceedances of the AQO.

6.17 In terms of $PM_{2.5}$ emissions, they are expected to stay relatively similar in 2041 to what they currently are, as for the City Centre.

Other Areas of Interest

6.18 The A2030 flyover in the northeast, is another area where there are increases in NO_X emissions predicted with the Local Plan in place. Current monitoring in this area (sites DT 162 and 163) show that measured annual mean NO_2 concentrations are around 37.0 µg/m^3. Whilst this level doesn't exceed the AQO for

[14] It is noted that individual air quality assessments of each development would still be required to be submitted as part of the planning process.

NO_2, it is within 10%. However, as there are no residential areas close to this road, this area is of less concern.

6.19 The section of the Havant Bypass (A27), between the A3/M27 roundabout and the A27/A2030 roundabout is also predicted to have increases in traffic and NO_X emissions. There are many residential properties, as well as schools, north of here (Drayton and Cosham). However, monitoring data in 2022 suggested that NO_2 concentrations were below the AQOs along Havant Bypass so these are of minimal concern in terms of current local air quality targets.

6.20 Within existing AQMAs outside of the City Centre, current diffusion tube monitoring within AQMAs 7, 9 and 12 for example recorded NO_2 concentrations well within the AQO in 2022. These areas suggest there has been improvements in emissions, and these could potentially be revoked in the future if there are at least five years of continued compliance.

Recommendations

6.21 Levels of NO_2 are the current concern for PCC as there remain exceedances of the annual mean NO_2 objective along busy roads in the City Centre, despite the introduction of the CAZ and other complementary measures. Vehicle related NO_x emissions have reduced over time, and they are predicted to continue to reduce as the vehicle fleet improves. The study has shown that total emissions in 2041 are predicted to be significantly lower than in 2019 and with the Local Plan in place, overall emissions across Portsmouth are lower in 2041 than without.

6.22 There only a few potential areas of concern that could potentially need further assessment and management. These are primarily focused in the City Centre, specifically Anglesea Road, Hope Street, Alfred Road and Marketway, particularly with the City Centre scheme in place. The area north of the Harbour in Cosham, residential areas around Havant Bypass and the Gatcombe area of Hilsea may also need further consideration to avoid any potential future air quality issues.

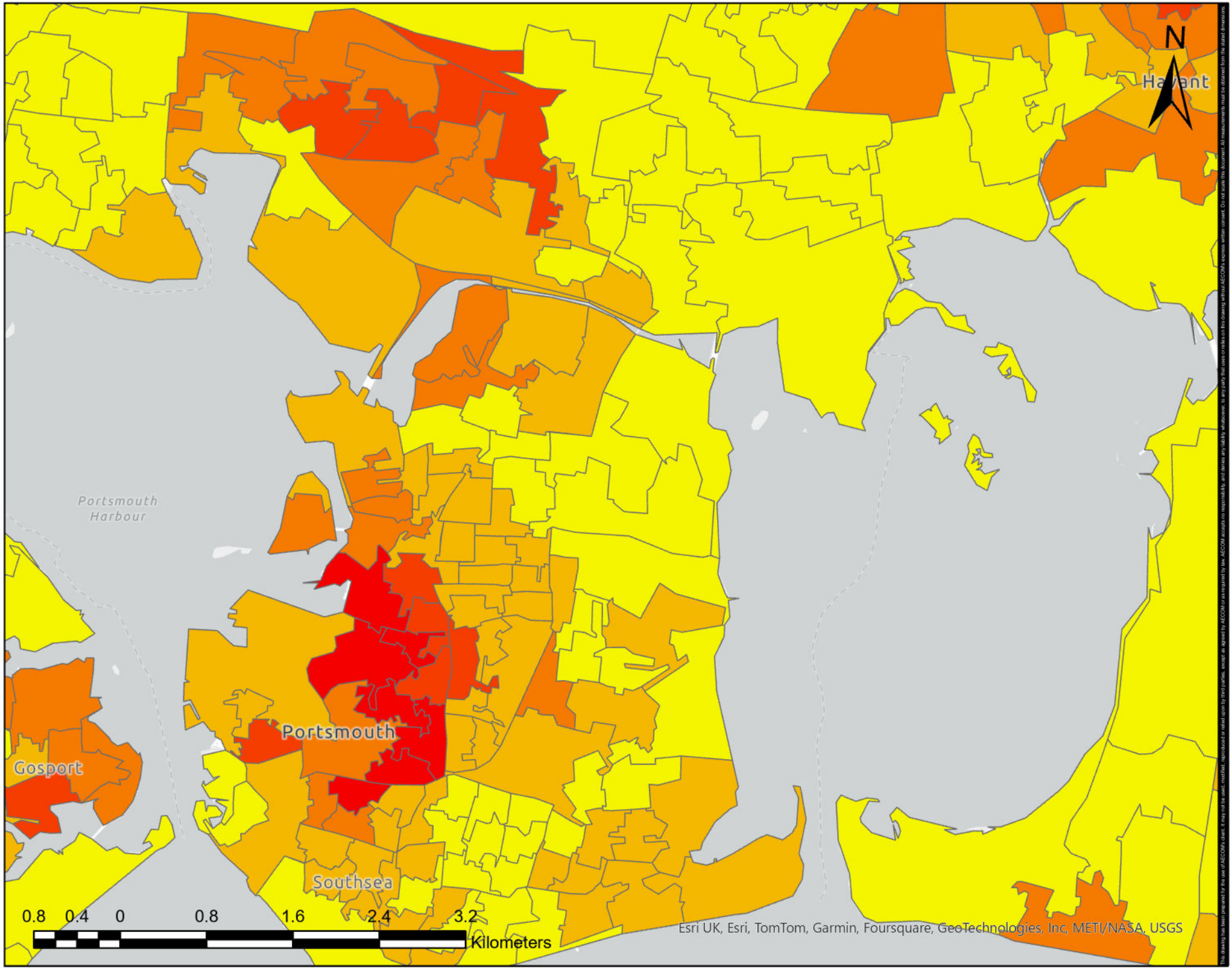
6.23 Future $PM_{2.5}$ emissions are predicted to be similar to current levels, even by 2041. Although there are no current exceedances of the existing $PM_{2.5}$ objectives, there are proposals to make these more stringent, for example to bring them in line with the World Health Organisation (WHO) guidelines. PCC should focus on strategies to reduce particulate emissions in their control to ensure that these future targets are met, as well as reduce the number of kilometres vehicles that are travelling across their network.

6.24 A number of recommendations for future work have been identified for PCC to consider. These are summarised below:

- This study represented a strategic overview of the Local Plan, and so it is assumed that individual planning applications will be subject to discrete air quality screening and assessment. This may be informed by the outcomes from this study to understand the long-term trends in emissions and the areas of greatest concern.
- The review of the in data published in the Indices of Multiple Deprivation may be used to inform an understanding of the existing exposure to emissions and poor air quality, but also the ability of residents to engage with potential measures to reduce emissions.
- Conduct a review of the distribution of current monitoring sites. The network is extensive, with 233 passive monitoring sites and 6 automatic monitoring sites. PCC may wish to consider reducing the number of sites concentrated in certain areas and redistributing monitoring in other areas to ensure there will be no future issues with exceedances, including Cosham, Drayton, Hilsea, Drayton and Paulsgrove.
- Undertake detailed dispersion modelling using ADMS-Roads to assess the impacts of the Local Plan in key areas, primarily in the current exceedance areas, close to and within the AQMAs in the City Centre as well as other areas identified in the study. This could be conducted using either average speed emissions or second-by-second emissions from a microsimulation model to aid further understanding on specific road links and junctions. This would help PCC to determine if these increases in emissions may lead to increases in NO_2 concentrations in a particular year, and whether this could lead to new exceedances of the AQOs.
- Consider commissioning fleet sensitivity studies to review different rates of future adoption of battery electric vehicles and how this may impact PM emissions. Consider strategies to target $PM_{2.5}$ in the future, such as further tightening CAZ standards or installing further electric vehicle charging points.

- Consider implications of nitrogen deposition on sensitive saltmarsh habits to the north of the centre as part of the HRA.
- When considering PM exposure in any future work, a specific value to disaggregation of the non-exhaust component should be used to inform mitigation action, due to the relatively increasing importance of this fraction of PM emissions during electrification of the fleet.

Appendix A Additional Figures



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND

Deprivation Index

IncScore

- 0.003 - 0.088
- 0.088 - 0.159
- 0.159 - 0.240
- 0.240 - 0.335
- 0.335 - 0.581

(Scale: 0 – Least Deprived Area and 1 – Most Deprived Area)

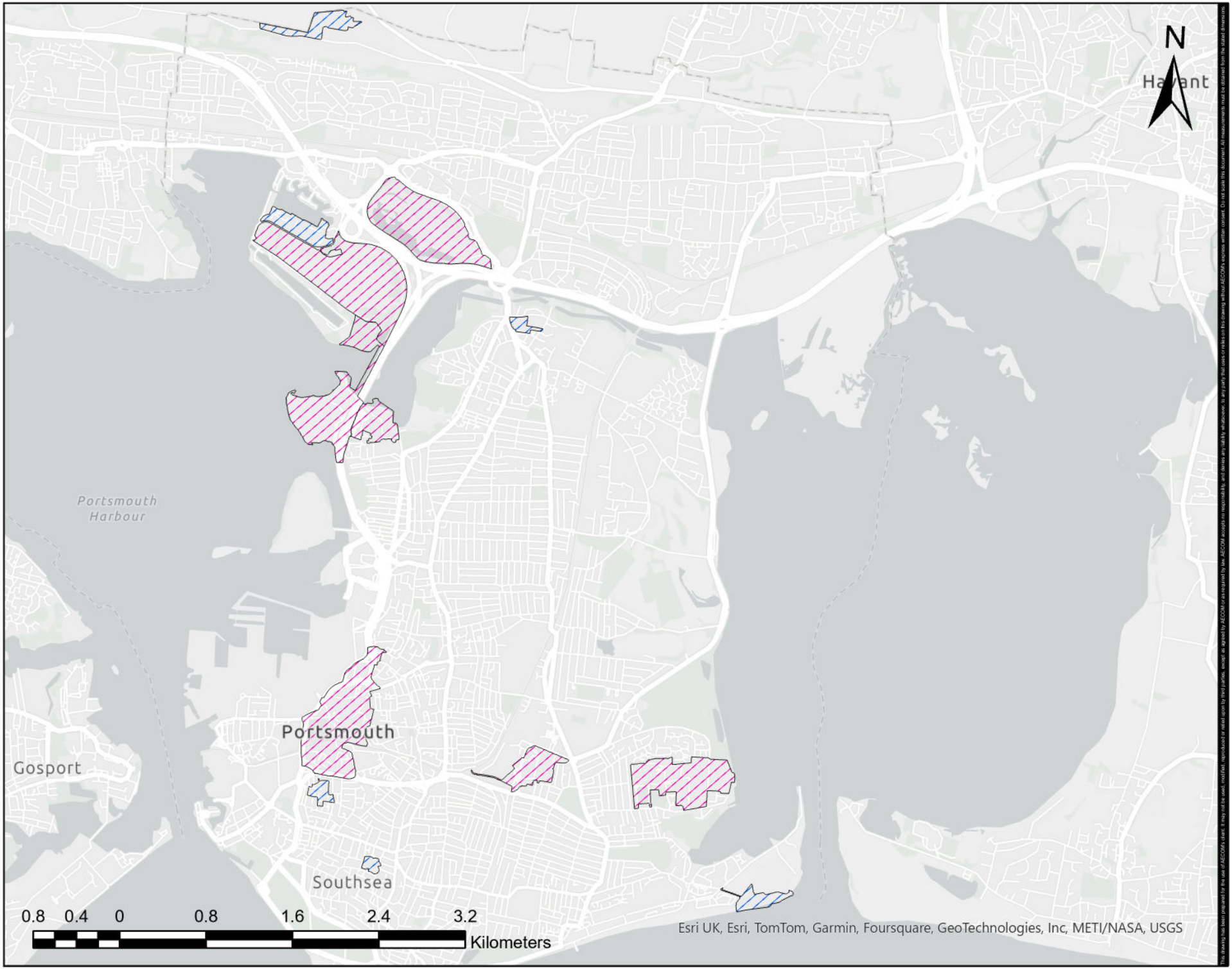
NOTES
Index of Multiple Deprivation

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
Index of Multiple Deprivation (IncScore) in Portsmouth

SHEET NUMBER
Figure 23



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 20/03/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND
- Reg19 Strategic Allocations
- Reg19 Strategic Sites

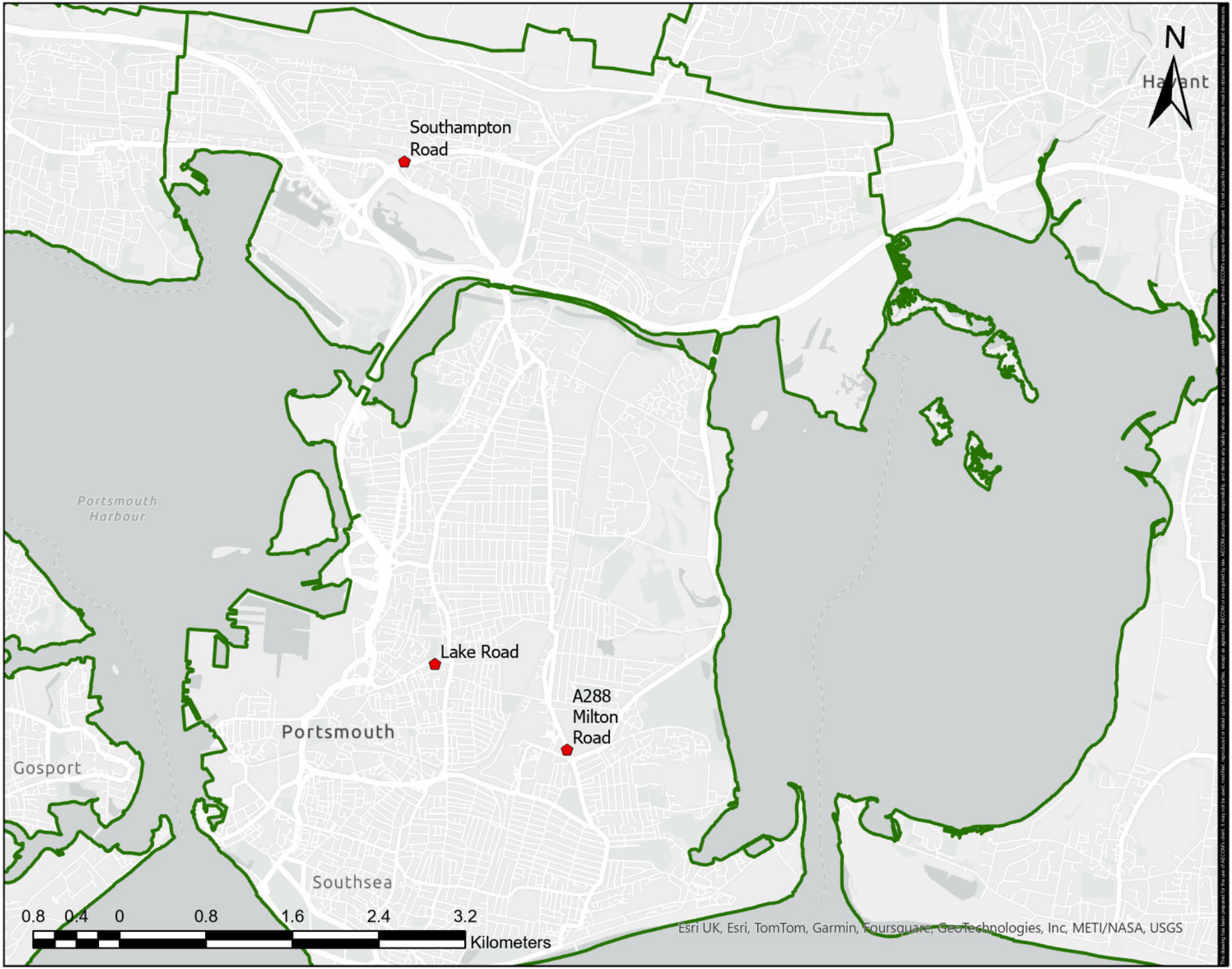
NOTES
Portsmouth LDS 2024

ISSUE PURPOSE
FINAL

PROJECT NUMBER
60586784

SHEET TITLE
Portsmouth Local Development Plan

SHEET NUMBER
Figure 24



Revision: Rev No. Drawn: SB Checked: DU Approved: AS Date: 18/04/2024

AECOM

PROJECT
Portsmouth Emissions Based Assessment

CLIENT
Portsmouth City Council

CONSULTANT
AECOM Limited
Sunley House
4 Bedford Park
Croydon
CR0 2AP
www.aecom.com

LEGEND
- Local Authority Boundary
- ANPR Sites

NOTES
Intelligent Data Collection Limited

ISSUE PURPOSE
FINAL

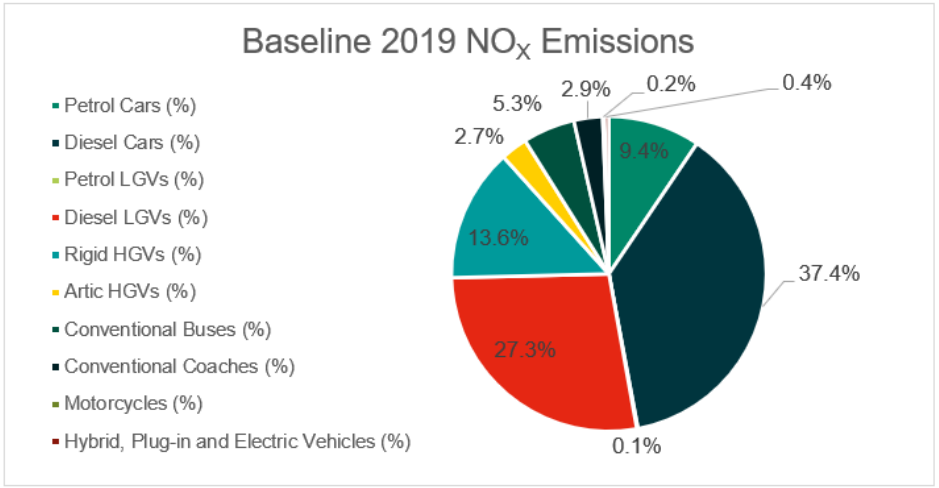
PROJECT NUMBER
60586784

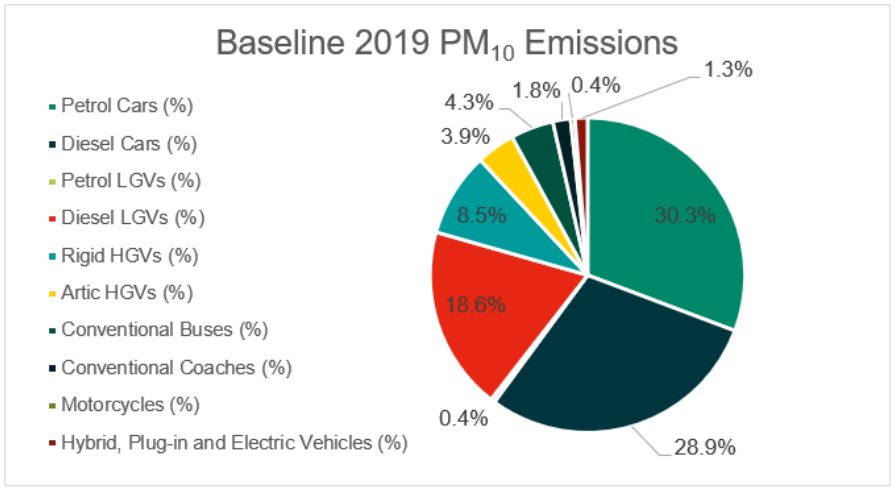
SHEET TITLE
Location of ANPR Sites

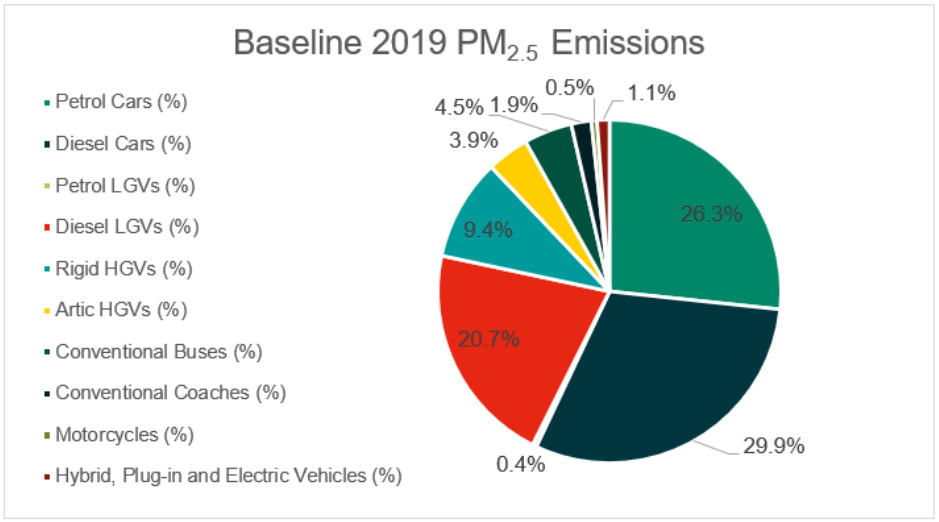
SHEET NUMBER
Figure 25

Appendix B Source Apportionment

Figure 26 Average breakdown of Emissions per Vehicle Type for the Baseline 2019 Scenario







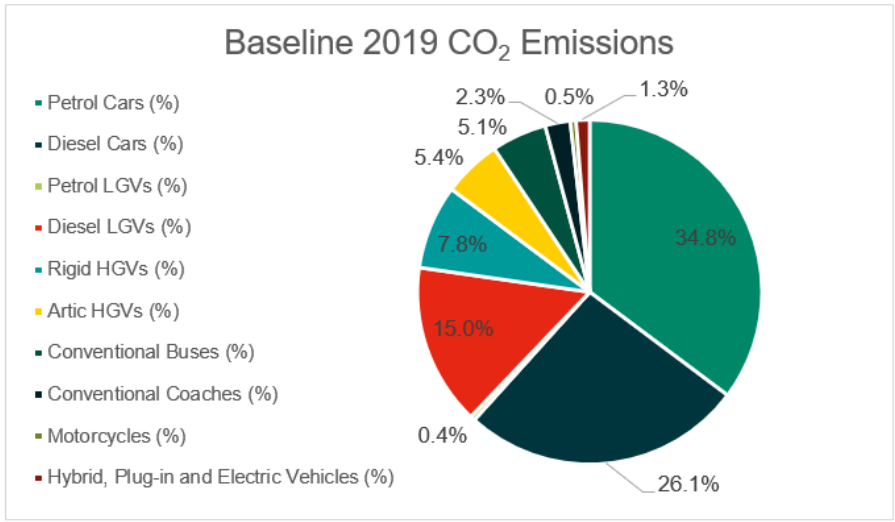


Figure 27 Average breakdown of Emissions per Vehicle Type for the DM2041 Scenario

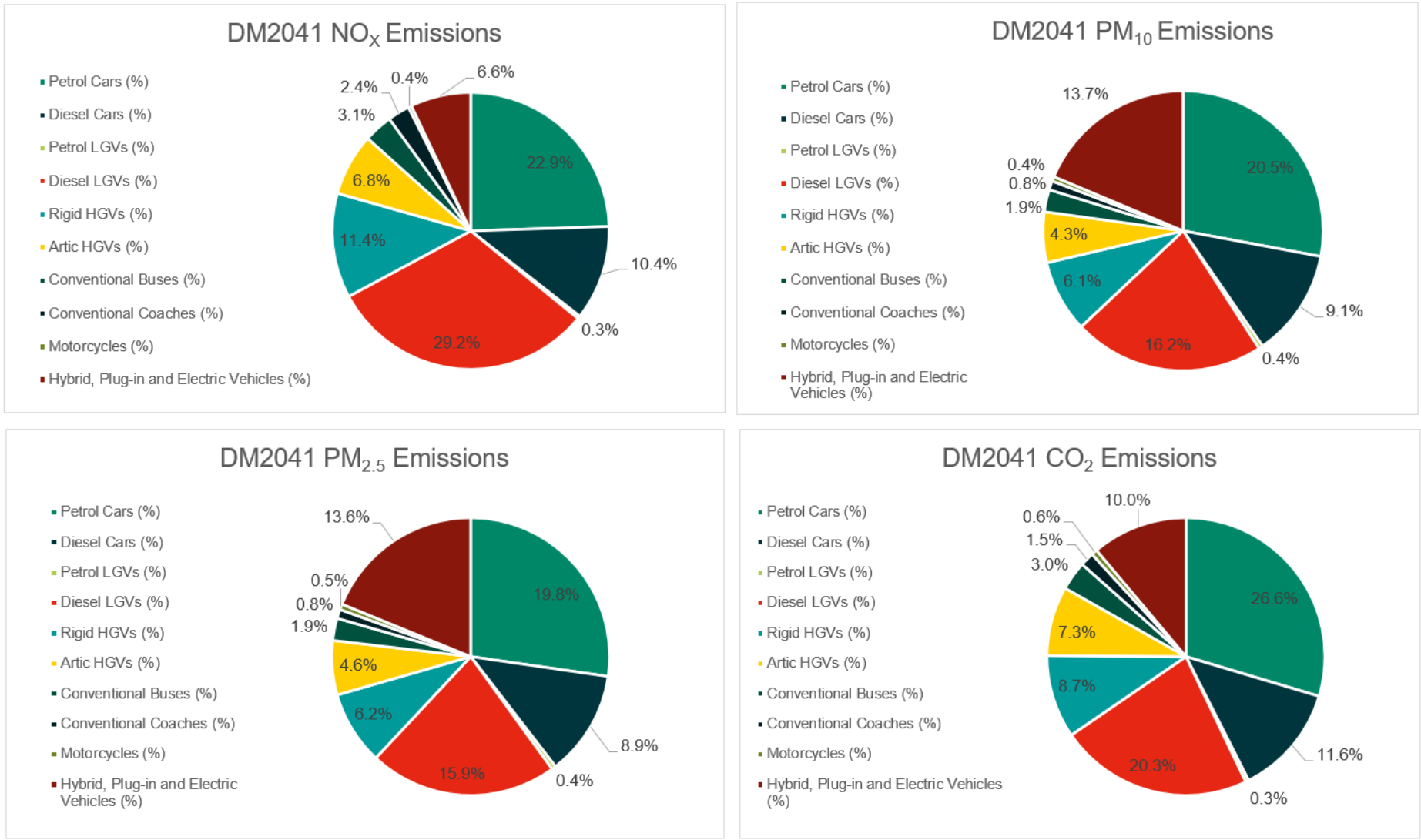


Figure 28 Average breakdown of Emissions per Vehicle Type for the DS2041 Scenario